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W. H. BOARDMAN, *President and Editor.*

E. A. SIMMONS, *Vice-President.*

RAY MORRIS, *Sec'y and Man'g Editor.*

R. S. CHISOLM, *Treasurer.*

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We print this week the final instalment of Mr. Williams' admirably lucid paper on railway capital and values, which shows a little better than anybody else has shown how meaningless the craze for valuation is. Apart from the main contentions, which are well summarized, we wish especially to call attention to the paragraph which comments on Professor Adams' foolish depreciation accounting:

If the Commission maintains its plan, and it be sustained, then the investment of new capital for reduction of expenses will be discontinued and it will only be employed for purposes that will increase the gross revenue.

We contemplate introducing a bill to require the Commission to repeat this solemn truth in unison at the commencement of each day's session.

As might have been foreseen the "multiple charter" issue has brought the final tribunals of Massachusetts and Connecticut into a butting collision. Whittling down to its pith the legal situation and its verbiage, the New York, New Haven & Hartford a few months ago "set up" a suit in which it asked the Supreme Court of Connecticut whether, the law of Massachusetts to the contrary notwithstanding, it, by a Connecticut corporation, could guarantee a security of the Massa-

chusetts company which controlled the New Haven's Massachusetts trolleys. Stated more broadly the case at bar was whether the New Haven's Massachusetts charter gave that state general jurisdiction over the New Haven's acts. The Massachusetts Supreme Court, in effect, had said "yes." The Connecticut Supreme Court now says "no," and sanctions the guarantee of the holding company's security. On the face of the thing there is a legal deadlock, but with the New Haven corporation entrenched more strongly than ever behind its legal breastworks. In the fog of litigation over the status of the Massachusetts trolleys and the Boston & Maine merger the layman hesitates to tread, but it looks as though the only final outcome of a judicial character might be through the federal court of highest resort. That is a long and devious legal pathway and common sense suggests such positive legislation in Massachusetts as will cut the Gordian knot of litigation. For two years the trolleys and the merger have been snarled up in and between the legislature and the courts, and one would think that even the quasi sovereignty of the state of Massachusetts would begin to get tired and yield somewhat of its dignity to the situation and the facts.

PROTECTIVE COATINGS FOR STRUCTURAL MATERIAL.

The work of scientific and technical societies which has been directed to the discovery of the cause and prevention of the corrosion of iron and steel, has suggested that oxidizing agents, such as chromium compounds, might prove useful if intelligently applied, but thus far there has been little accomplished in the production of preventive pigments made on this principle. One useful suggestion is found in a paper on Protective Coatings for Structural Material, by R. S. Perry, presented at the meeting of the Western Society of Engineers, April 21, 1909. In shipping structural material and some parts of machinery they are exposed to sulphur gases from the locomotive and moisture from rain and fog, and it is desirable to give them a protective coating so that corrosion will not set in before the finishing paint is applied. The usual practice is to swab the metal with crude oil, or dip it in hot linseed or other drying oil, or by applying cheap paints as shop coats. Mr. Perry points out the objection to this practice as follows: "The crude oil leaves upon the surface of the metal, even after wiping, a quantity of non-drying mineral oil which interferes with the drying of the paint coat, which is afterward applied at the time of the assembling of the metal. It also prevents the paint coat from properly adhering to the steel surface, and this coat of crude non-drying oil, which still exists between the metal and the paint coat, is a source of never-ending trouble, causing peeling and shriveling. This crude oil treatment, therefore, should be avoided whenever it is intended that the steel is to be subsequently painted with oil paints. Where linseed oil instead of crude oil is used, a film of the oil is left upon the metal and rapidly oxidizes to a coat of linoxyn. This coat will protect the metal for a certain period of time, but is extremely porous and ultimately admits moisture. If, within this coating of linseed oil, there had been contained a proportion of pigment, or if the linseed oil had been developed by gums into a varnish or lacquer, then the excluding properties of the linseed oil would have been increased, and, if the formula were inhibitive in nature, the steel would be better protected from corrosion, and the application of future coats of paints, after assembling the steel, would have been practical and facilitated." He also recommends a new method, which is the first suggestion we have seen in which there is a practical application of chromium compounds for preventing corrosion. It is as follows: "It is sometimes desired to give to steel a thin adherent protective coating that is transparent and will allow of the inspection of the steel by the engineer, who desires to observe whether the metal is absolutely clean and free from rust before proceeding with the painting thereof. In a case like this, there is required a coating of oil containing

materials which will not interfere with the transparency of the oil coat and which, at the same time, are thoroughly inhibitive in nature. Such a compound may be prepared by the use of chromium compounds soluble in linseed oil, such as chromium resinate or chromium linoleate. By the use of these materials within an oil coat thorough inhibition is obtained, and at the same time there is added the excluding properties which these compounds afford. A thoroughly inhibitive and transparent coating is thus formed and is of most practical use. A paint coat applied to steel protected by this inhibitive oil coat amalgamates with the oil coat and becomes an integral part thereof, rendering at the same time the oil paint thoroughly inhibitive and causing close adherence to the metal surface."

GOVERNMENT RAILWAYS OF CANADA.

The Intercolonial, the Windsor Branch (maintained only and leased for operation) and the Prince Edward Island Railway are the government railways of Canada. The gross earnings of these roads for the 12 months, April 1, 1907, to March 31, 1908, amounted to \$9,534,569, and operating expenses were \$9,595,295, which leaves a loss from operation of \$60,726. It must be remembered that this loss from operation is an entirely different figure from a deficit shown on a privately operated road after the payment of fixed charges. On the government railways there has been no charge whatsoever for interest on capital expenditure on the roads. As the total mileage operated of the three roads is 1,748 miles, and the Intercolonial has a mileage of 1,449, it is sufficient to examine the report of this road by itself.

Gross earnings for the year amounted to \$9,173,559, and total operating expenses were \$9,157,436, leaving net earnings of \$16,123. This unprofitable result was not caused by a bad business year, for earnings last year were \$867,575 greater than in the preceding 12 months, and both the number of passengers and the number of tons of freight carried were greater last year than in the previous year. Since operating expenses consumed nearly 100 per cent. of earnings, it is interesting to see how they are divided. Maintenance of way and structures cost \$1,630,965, or \$1,126 per mile of line. In itself, this is not an excessive figure, but it is high for the territory served. Maintenance of equipment cost \$1,996,389. The unit costs are shown in the following table:

	1908.
Repairs and renewals, per locomotive.....	\$2,117
" " " " passenger car	715
" " " " freight car	54

The expenses are so divided as to fall under four general heads: Maintenance of way and structures, which consumed 17.78 per cent. of gross earnings; maintenance of equipment, which consumed 21.76 per cent.; conducting transportation, which consumed 57.56 per cent., and general expenses, which consumed 2.72 per cent. It will be seen that maintenance expenses consumed a considerably greater portion of gross revenue on the Intercolonial than on the majority of even fairly well-managed, privately owned roads in the United States, but conducting transportation cost more than total operating expenses do on a number of roads in the United States.

Products of mines, products of forests and manufactured goods, including rails, are the three classes of traffic which furnish the greatest tonnage. Each one of them furnished last year over 1,000,000 tons of freight, the products of mines furnishing the greatest, this tonnage totaling 1,371,280 tons. Under the head of products of forests it is interesting to note that 286,242 tons of the total tonnage of 1,151,923 was tons of pulp wood.

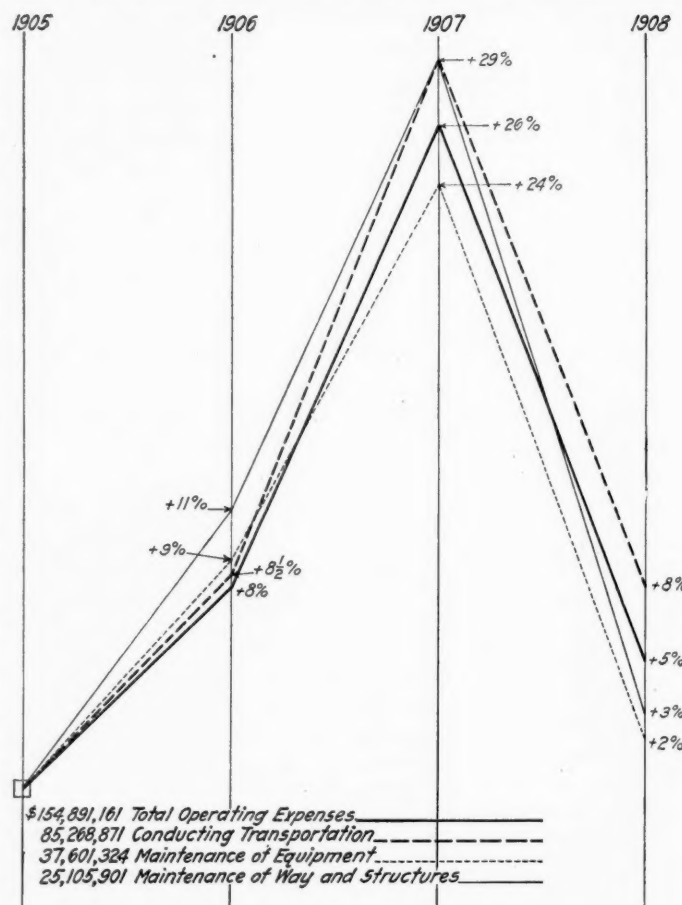
Freight statistics show that the average train load of revenue freight was 228 tons in 1908 as compared with 224 tons in 1907, and the average distance each ton was carried was 253 miles last year and 260 miles in the previous year. The average rate per ton per mile, which is not given in the report of the

Department of Railways and Canals, but which is obtained by multiplying the total revenue freight tonnage by the average haul per ton and dividing this into the total freight revenue, is 0.58 cents.

The annual report of the Department of Railways and Canals from which these figures have been obtained does not give any general condensed balance sheet for the Intercolonial Railway such as is given in most annual reports of railways in the United States, but it does state that during the fiscal year ended March 31, 1908, there was spent on the Intercolonial, \$4,382,494 and charged to capital account. The total capital expenditure on the whole road, together with the acquired Canada Eastern, has been \$87,127,432, which sum is apparently not earning any interest charges at all. The study of these figures and others given in the annual report referred to should be of interest to any one who advocates government ownership, especially if he bear in mind that in general there is much less graft, honest of otherwise, under British party government than in the United States.

OPERATING RESULTS IN 1908.

Some months ago we commented on the unfairness of the Interstate Commerce Commission in seeking to minimize in the eyes of the country the effect of the hard times upon railway earnings. The Commission took the 1908 fiscal year, ended June 30, and compared it with the 1907 fiscal year,



Operating Expenses of the Pennsylvania and the New York Central—Percentages of Increase from 1905 as a Base.

thereby mixing half a year of extraordinarily good times with half a year of bad times, and announced with pride that the reduction in earnings for all the railways in the country amounted to only 6¼ per cent.

The reports of the Pennsylvania and the New York Central, covering the calendar year 1908 (not the June 30 year) are now at hand. It will be recalled that the effects of the panic

did not strike the railways in 1907 until well along in December, and in some cases the effects were postponed even longer than this. The 1908 calendar year, however, shows pretty well what happened to the roads. During that year the New York Central lost 9.7 per cent. of gross and the Pennsylvania lost 17.3 per cent. The comparative showing of the New York Central would have been even worse, except for the fact that

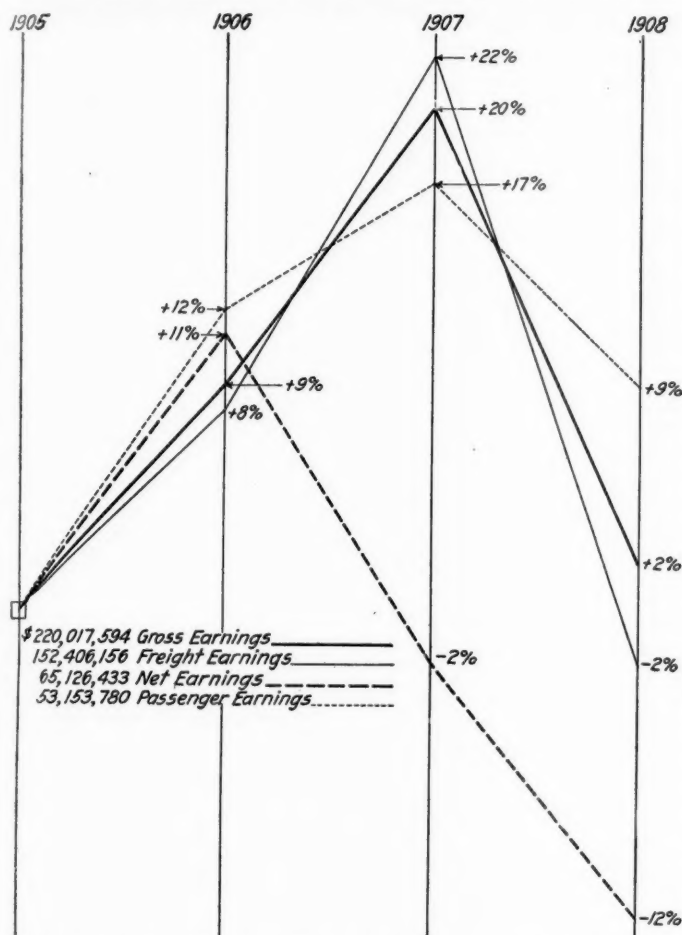
as fast in times of adversity, but maintains a course which comes much closer to being constant than does freight business. The passenger earnings of the New York Central and the Pennsylvania, viewed as a combined system, were 9 per cent. better in 1908 than they were in 1905, and the greatest increase they reached in 1907 was 17 per cent. above 1905, whereas freight earnings went up to 22 per cent.

LOBBYING WITH THE PEOPLE.

At the recent sessions of the legislatures of Utah and Idaho bills were introduced to create state railway commissions with large powers, especially for the regulation of rates. The railways thought that these bills were unwise and concluded to oppose them. They had been denounced on similar occasions before for lobbying at the state capitals. The Harriman Lines decided on this occasion to carry their fight direct to the voters and to "lobby" openly with them against the proposed measures, and they waged for several weeks a unique "campaign of education" on the railway question.

J. A. Reeves, General Freight Agent, wrote the open letter, extracts from which we published in our issue of April 9, page 809. Then the General Freight Department of the Oregon Short Line issued and circulated widely a 26-page pamphlet entitled, "Railroad Rates; Some Explanations and Suggestions," which outlined clearly, simply and concisely the principles and methods of railway rate-making. Other open letters also were sent out. On August 10, 1908, the Beaumont (Texas) *Daily Journal* printed almost a page editorial on the "Increase of Interstate Rates," which described in detail the ill effects that Texas has suffered from the drastic policy of regulations in that state. The Harriman Lines had printed a photographic reproduction of the page on which this editorial appeared and gave it wide circulation in Idaho and Utah. Similar use was made of the paper read by E. W. McKenna, Vice-President of the Chicago, Milwaukee & St. Paul, before the Western Railway Club on October 20, 1908, entitled "A Constituency without Representation," and also of the following editorials which appeared in the *Railroad Age Gazette* on the dates named: "One View of Railroad Capitalization," and "The Growing Problem of Adjusting Rates to Conditions," June 26, 1908; "Protectionism and Railway Legislation," December 18, 1908; and "Commodity Values and Freight Rates," January 8, 1909. This is only a partial list of the literature which the Harriman Lines circulated much as political parties circulate campaign literature. The results were significant. The Utah Commission bill was defeated in the Senate by a vote of 12 to 4, and the Idaho bill was defeated in the House of Representatives by a vote of 37 to 14.

There is an important lesson in this for the railways in all parts of the United States. A good many railway men have doubted the ability of the so-called "plain people" to pass intelligently on railway questions. A good many have thought that the method of lobbying at the state and national capitals is less troublesome and surer. But this method, besides being in many instances mutually corrupting to railways and to politics, breaks down just when the roads most need protection against unjust and harmful regulation. No doubt it is true that the average business man or farmer has neither the time nor the ability to acquaint himself thoroughly with the complexities of railway rate-making and operation. But in the long run all the great public questions in this country are settled by the people. If the people do not understand them they will settle them unwisely. In proportion as they have correct information and ideas they will settle them less unwisely or more wisely. One reason why the regulation of railways in the past usually has been unwise and unfair is that those who know the most about the railway business commonly have given the least time and effort to enlightening others about it. Meantime those who thought they could profit by disseminating misinformation and fomenting public prejudice



Earnings of the Pennsylvania and the New York Central—Percentages of Increase from 1905 as a Base.

the comparison is with 1907—a year when the road was much troubled by the temporary paralysis that seemed to affect its operation and management. In 1908 it turned over a new leaf, but lost almost 10 per cent. of gross earnings.

The accompanying diagrams are composites of the operating experiences of these two roads and show increases and decreases per cent. from the year ending December 31, 1905, as a base. The first thing that strikes the observer is that gross earnings, total freight earnings, and the cost of maintaining equipment, way and structures, are all within 3 per cent. of what they were in 1905; that is to say, that the actual business done by the roads was practically on a 1905 basis this last year, but it is very noteworthy that the cost of conducting transportation has not declined as fast as earnings or as the other items of expense, illustrating the effect of the wage increases during the prosperous years, not yet adjusted to existing conditions. Two other things are especially noteworthy about these diagrams; one of them is that net earnings are 12 per cent. below what they were in 1905 in spite of the extraordinary efforts of the roads to cut down all unnecessary costs. Fixed charges, payable from these net earnings, have of necessity increased.

The other interesting thing is the comparatively slow fluctuation of passenger traffic throughout the period. We have called attention before to the fact that passenger traffic neither rises as fast as freight traffic in times of prosperity nor falls

have been active. The shipper who hoped to get more advantageous rates, and the politician who hoped to ride the storm of anti-railway agitation into office, has been untiring. If the results have been bad for the railways, those who have not done what they could to protect them are as much to blame as those who have done all they could to harm them.

The railway is private property. But it is engaged in a public service. Being engaged in a public service brings it into constant contact with the public and makes all it and its officers and employees do matters of peculiar public interest. Whether railway men enjoy it or not, the public will always continue to take a special interest in railway matters. The roads will be more rather than less in the spotlight in the future than heretofore. The method of trying to protect them against unfair regulation by exerting proper or improper influence on legislatures and commissions is a temporary device. It may keep one legislature or commission from passing unwise laws or issuing injurious orders, but it will not keep an anti-railway legislature from being elected at the next election or a radical commission from being created or chosen. On the other hand, fair rates, honest practices and efficient management, supplemented by continuing effort to conciliate and educate public sentiment, will enable the roads to withstand unfair agitation permanently. Railway managers will see the wisdom of making more and more use in future of the plan of campaign that the Harriman Lines found effective in Utah and Idaho.

TEXAS & PACIFIC.

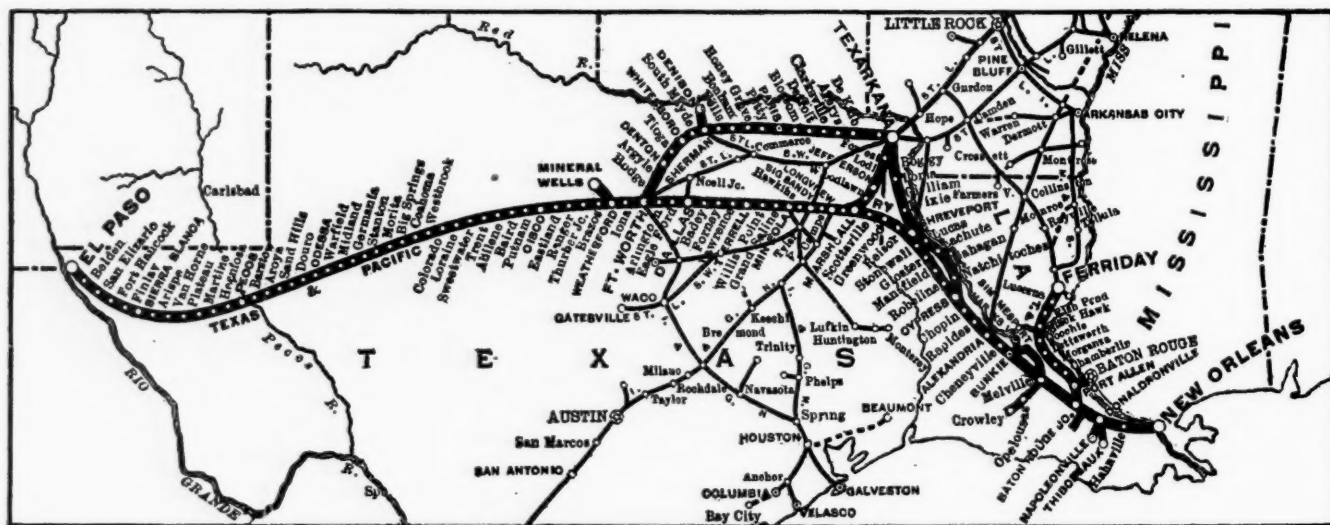
Of a total mileage of 1,885 miles operated in 1908 by the Texas & Pacific, 620 miles is known as the Rio Grande division. The division extends from Fort Worth, Tex., to El Paso, and when the property was taken over by the reorganiza-

year totaled 200,000 bales as against 180,000 bales in the previous year. The tonnage of flour and miscellaneous agricultural products, as well as of live stock, increased. The cotton crop would have yielded probably a considerably greater tonnage but for the trouble experienced with the boll weevil in the Louisiana district. Notwithstanding the good crops, the general business depression caused a heavy decrease in the tonnage of manufactures and miscellaneous articles carried, and the annual report states that the transportation of this class of freight yields the greatest revenue, and the loss in revenue from this class was \$829,156 last year.

Added to the misfortune of a bad business year there was the expense and damage caused by extraordinarily heavy rain storms, and it is estimated that the destruction caused by floods cost the Texas & Pacific \$350,000 in earnings and \$250,000 physically. From April to July some portion or portions of the company's lines were broken and traffic seriously interrupted.

The total operating revenues amounted to \$13,900,000 last year as against \$16,700,000 in the previous year, there being a decrease in revenue received from all sources, the decrease in freight revenue, however, being the most important. The receipts from this source were \$9,400,000 in 1908 as against \$11,300,000 in 1907, a decrease of 17 per cent. The falling off in freight revenue resulted from a decrease in tons of freight carried, which amounted to 8 per cent., and a decrease in the average haul from 212 miles in 1907 to 185 miles last year. It will be seen, therefore, that it was in what the Texas & Pacific calls its competitive or through freight tonnage that the greatest loss occurred. As a matter of fact, the local freight tonnage in 1908 was 2,600,000 tons, an increase of 19,000 tons, while the tonnage of competitive freight in 1908 was 2,400,000 tons, a decrease of 450,000 tons.

If the falling off in tonnage was in the best paying traffic,



Texas & Pacific.

tion committee in 1887, considerable parts of this Rio Grande division were thought to be of questionable value. Since 1902, however, the country along this line, especially in the Pecos valley region, has been rapidly developed, and land that was previously an absolute barren waste is now being put under cultivation and is yielding large crops of cotton and other produce. So closely is the development of the business of the railway connected with the development of the country through which it passes that the chief interest in the study of the property in 1908 lies in an examination of the conditions in southeastern Texas and southern Louisiana.

The crops were excellent last year as compared with 1907, and it is of course on the crops, especially on cotton, that the Texas & Pacific depends for a considerable part of its freight revenue. The tonnage of cotton carried by the railway last

it seems rather surprising that the rate received per ton per mile increased, the rate being 1.03 cents in 1908 as against 0.99 cents in 1907; but this fact is probably accounted for by the shorter average haul, since, of course, freight is charged proportionately very much more for a short haul than for a long one.

For all that, expenses amounted to \$10,300,000 last year as against \$11,600,000 in 1907, so that the reduction in expenses was not proportional to the decrease in earnings, the Texas & Pacific made a very good showing last year in its expense account. The reduction in expenses came where it was most helpful and also where it showed the best management, that is, in transportation expenses. These expenses amounted to \$5,700,000 last year as against \$7,100,000 in the previous year and \$6,000,000 in 1906. Maintenance of equipment decreased

slightly from 1907 figures, but the 1907 figures were materially larger than the figures for 1906. The total expense for maintenance of equipment last year was \$2,200,000. Maintenance of way and structures cost \$1,800,000, which is about \$200,000 more than in 1907 and about \$300,000 more than in 1906.

Cost of maintenance of way and structures per mile of first and second track (switch tracks and sidings being counted half) is shown in the following table. The table also shows the unit costs of maintenance of equipment:

	1908.	1907.
Maintenance of way, per mile.....	819	752
Repairs, per locomotive.....	\$2,005	\$2,348
" " passenger car	801	1,041
" " freight car	56	63

During the last few years the Texas & Pacific has been spending considerable sums on the improvement of the roadbed and permanent way. Last year \$304,800 was spent on this account, \$100,000 of which was for ballast. The road probably needs all the expenditure for improvement that the company can afford. Of 1,925 miles of main track, 1,246 miles is laid with 75-lb. rails and 492 miles with 56-lb. rails. Twenty-one miles of 75-lb. rails were laid in track last year. It should be remembered, however, that an attempt to maintain roadbed of Pennsylvania standard in Texas country is as much of a mistake as it is to fail to maintain the roadbed in sufficiently good condition to economically handle the traffic offered. A road situated like the Texas & Pacific necessarily grows up with the country, and the fact that in the early days it was not much more than a streak of rust is nothing against it now.

Along with the other Gould roads, the Texas & Pacific is in need of money. It was not, however, in any more need of money on December 31, 1908, than on the same date in 1907, and that, after a year of business depression, is rather a good sign. Cash on hand amounted to \$297,445 in 1908 as against \$155,520 in 1907, and current assets totaled \$2,113,613 last year as against \$2,699,153 in the previous year. Current liabilities last year amounted to \$8,320,085 as against \$8,496,490 in the previous year. Both vouchers and payrolls unpaid and sums due other roads are somewhat less this year than last year, but the floating debt of bills payable has increased by about \$700,000, being \$5,865,398 last year. If the company can satisfactorily fund this floating debt it should be in a good position. Capital stock has been issued to the extent of \$20,564 per mile, and bonded debt amounts to \$30,658 per mile of line owned. There are obligatory interest charges of \$836 per mile owned and conditional charges of \$697, making a total of \$1,533. The net revenue per mile of road owned last year amounted to \$1,712, which leaves \$179 earned per mile after the payment of obligatory and conditional charges.

The following table shows the results of operation for the years 1908 and 1907:

	1908.	1907.
Average mileage operated	1,885	1,885
Freight revenue	\$9,401,569	\$11,273,331
Passenger revenue	3,568,420	4,088,132
Total operating revenue	13,917,315	16,671,668
Maint. way and structures	1,800,898	1,655,856
Maint. of equipment	2,171,407	2,245,957
Traffic	190,207	100,033
Transportation	5,735,105	7,145,760
Total operating expenses	10,288,808	11,577,940
Taxes	558,428	604,100
Net revenue	3,070,079	4,489,628
Improvement and equipment	905,588	2,226,736
Surplus	342,071	940,720

GRAND RAPIDS & INDIANA.

The Grand Rapids & Indiana is controlled by the Pennsylvania Company, but operated separately. The Cincinnati, Richmond & Fort Wayne, the Muskegon, Grand Rapids & Indiana and the Traverse City are also controlled by the Pennsylvania Company and are operated as part of the Grand Rapids & Indiana. Of the 592 miles operated, nearly all is in the state of Michigan, with the remainder in the state of Indiana. The main line extends from Mackinaw City, at the junction of Lake Michigan and Lake Huron, almost directly south to Richmond, Ind., and from there the G. R. & I. gets into Cincinnati

over the tracks of the Pittsburgh, Cincinnati, Chicago & St. Louis. There is a branch near the head of Lake Michigan to Northport, and two-thirds of the way down the lake, a branch from Grand Rapids to Muskegon.

Reductions in passenger fares from a maximum of two-and-a-half cents to two cents per mile became effective in Indiana on April 10, 1907, and in Michigan on September 28, 1907. It will be seen, therefore, that in 1907 the Grand Rapids & Indiana operated under the two-cent fare law only during three months, so that the year 1908 is the first one which gives a true index of the effect of this law.

Last year the total number of passengers carried amounted to 2,495,814, an increase of 6.64 per cent. over 1907. The average haul was less last year, so that the passenger mileage amounted to 79,318,038, an increase of but 3.58 per cent. over 1907. At the same time, passenger train mileage totaled 1,336,892, a decrease of 11.72 per cent. Earnings per passenger per mile were 1.85 cents, or 11.05 per cent. less than in 1907. The average expenses per passenger per mile were 1.97 cents in 1907, and for some reason are not worked out in the report for 1908, but by deriving them from figures that are given, it would appear that they were 1.64 cents, or 10.65 per cent. less than in 1907. It is evident, therefore, that the company attempted to and nearly succeeded in reducing passenger expenses proportionately to the reduction in passenger earnings through a reduction in passenger train mileage, and notwithstanding this reduced service, passenger earnings amounted to but \$1,500,000, or 6.14 per cent. less than in 1907.

President Wood in his report gives point to the conclusions to be drawn from these figures by remarking that "anticipating a reduction in passenger earnings, an effort was made to offset this by reduced train service, which reduction, while permitting considerable saving in expenses, caused such complaints from localities affected that the service was restored." In other words, the company was between the devil in the form of the state railway commissions and the deep sea of public complaint.

Passenger earnings form relatively a greater proportion of gross on the Grand Rapids & Indiana than on the Pennsylvania Company itself, but are of course considerably less than half gross earnings. Freight earnings amounted last year to \$2,600,000, a decrease of about \$600,000 from the previous year. A large proportion, 31.48 per cent. last year, of the total tonnage is products of forests, and the falling off in tonnage of these commodities was very severe last year. A strong plea is made by the company's management for the preservation of the forests of northern Michigan. It is estimated that timber will be nearly exhausted in from 25 to 30 years, and on the face of it, there is no other class of commodities that can furnish tonnage to such a road as the Grand Rapids & Indiana to make up for the loss from the exhaustion of timber. The road's management, therefore, is particularly interested in seeing a comprehensive plan for the reforestation of exhausted timber lands put into effect.

The average train load was 273 tons last year, or 20 tons less than in the previous year, and the average haul was 96 miles, a decrease of about seven miles. This much shorter average haul accounts in part for average earnings per ton per mile of 0.73 cents as against 0.68 cents in 1907. The average net earnings per ton per mile were 0.12 cents in 1907 and 0.11 cents last year.

The company met its reduction in earnings by heavy reductions in maintenance charges and some saving in transportation charges. Total expenses, including taxes, amounted to \$3,500,000 in 1908 and \$4,200,000 in 1907. Maintenance of way and structures cost about \$526,000 last year, a decrease of \$248,000, and maintenance of equipment cost \$649,000, a decrease of \$243,000. It is impossible to make a comparison of the unit costs of maintenance between last year and 1907 because of the changes in accounting methods prescribed by the Interstate Commerce Commission, but the totals are not seriously affected and apparently show that the road made such

heavy reductions last year that a return to the former scale of expenditures will be speedily necessary.

Among the causes of a decrease in net earnings that were beyond the control of the management of the road was an increase of 8.5 per cent. in taxes, which brought the total of taxes paid in 1908 up to \$249,000 or 5.72 per cent. of gross earnings.

The cost per mile of track is shown in the following table. The table also shows the unit costs of repairs of equipment:

	1908.
Maintenance of way, per mile.....	\$889
Repairs per locomotive	2,148
" passenger car.....	479
" freight car	65

These are low costs for a "Pennsylvania" road.

A dividend of 3 per cent. was paid, and after charging \$52,000 for additions and betterments and making a payment on account of principal of car trusts of \$23,000, the company transferred to the credit of profit and loss, \$13,400.

President Wood sums up the company's situation as follows:

"A property which under reorganization can reduce the interest on its bonded debt to 4.19 per cent., and yet only return to its shareholders an average of 1.93 per cent. annually, during the twelve years since its reorganization, and nothing prior thereto, certainly cannot make these expenditures [for facilities increasing the earning power of the property and, in the very near future for the separation of grades in the larger cities] from its income, and more certainly cannot raise the necessary money for such improvements through the issuance of securities, except at a great loss and expense."

The following table shows the results of operation for the last two years:

	1908.	1907.
Average mileage operated ...	584	582
Freight	\$2,587,087	\$3,208,098
Passenger revenue	1,503,224	1,594,234
Total operating revenue.....	4,355,345	5,063,669
Maint. way and structures.....	525,601	773,935
Maint. of equipment.....	649,254	892,112
Traffic	120,026	124,044
Transportation	1,777,533	1,988,563
Operating expenses	3,233,495	3,940,894
Taxes	248,984	229,509
*Net earnings	872,866	893,266
Gross income	727,751	801,299
Net income	262,447	322,882
Dividends	173,730	173,730
Additions and betterments.....	52,390	65,222
Surplus	36,327	83,930

*This is before the deduction of rentals paid roads operated on a basis of net earnings or additions of rents from other roads.

NEW PUBLICATIONS.

American Electric Railways.—A report before the International Street Railway & Light Railway Congress at Munich, September, 1908. By Eugene Elchel, Berlin, Germany. 42 pages; 8 in. x 10½ in.; paper.

The report at hand is printed in German, and represents a good survey of the general subject of railway electrification in the United States, having special reference to electrification on standard lines rather than to street railways, although fairly complete street railway statistics are also published.

The Mechanical Engineering of Steam Power Plants. By F. R. Hutton. Third edition; rewritten. New York: John Wiley & Sons. 825 pages; 6 in. x 9 in.; 700 illustrations. Cloth. Price, \$5.

This work is one of some magnitude and represents a compilation of a wide range of facts, information and general comment upon the various details of the power plant. While it does not enter sufficiently into detail to enable the reader or student to design any of the parts that enter into the making up of the boiler or engine or their auxiliaries, it does take each of these parts individually and separately in such a way that their functions and operations are made perfectly clear. It is descriptive rather than analytical. It is a long and interesting compilation of facts, which, however, does not go very closely into the correlation of those facts, nor does the author delve into the fundamental principles upon which their existence is based. In short, we have a very complete statement of the effect with but comparatively little consideration of the cause.

To illustrate this take any chapter in the book, that on water-tube boilers for example. The introductory paragraph gives a brief description of the characteristic features of the construction, and the differences existing between the water and fire-tube varieties. Then follow descriptions of the various constructions, starting with the plain cylindrical boiler, which is here regarded as in the water-tube class though not usually so ranked. The elephant boiler follows, and then an outline of the sectional design, with a statement of its advantages and disadvantages. The classes of the sectional boiler are described, and then there are detailed descriptions of the spheroidal, vertical and horizontal open tube, such as the Babcock & Wilcox and Thornycroft, with short concluding paragraphs on the closed straight and curved tube types. There are no conclusions, nor need there be, for the book is one of instruction and description of current types and practice. In this it is full and complete and the matter is presented in an admirably interesting manner. The same method of presentation is followed throughout the whole, dealing successively with the boiler, its methods of riveting and staying, the externally and internally fired and coil and flash boilers, the furnace, the fuel, the boiler accessories, and the care, management and inspection of boilers. The engine is treated in the same manner, the several chapters being devoted to the movement of the parts, the expansive working of the steam, the compound and multiple expansion engine, the turbine, foundations, the details, such as cylinders, pistons, crossheads, etc.; the valves and valve gearing and governors. Then come the auxiliaries, care and management.

Throughout the work it frequently becomes necessary to enter upon a mathematical analysis of the structure under consideration in the matter of its movements, and this is done in smaller type and is usually clear and concise to the reader who can follow it; but this class of work is avoided to as great an extent as possible and attention paid strictly to the descriptive feature of the text.

The book is one that would be of value to the student who is learning of the functions of the power plant and to whom a knowledge of the various types of construction is necessary; and to the lay owner who wishes to familiarize himself in a general way with his property and have some idea of what he is buying. It is difficult to determine from the preface as to exactly the class of readers the author had in mind, but he has succeeded in compiling a book of interest and value not only to the classes named but to the general engineer. It would be well, however, in future editions to greatly amplify the index, for, as it now stands, it is quite incomplete and does not do justice to the work.

Parallel Tables of Logarithms and Squares. By Constantine Smoley, C.E., New York. The Engineering News Publishing Co. 460 pages, 4½ in. x 7 in., flexible leather. Price, \$3.50.

As this book consists simply of a series of mathematical tables, about the only review possible is that of a statement of the table of contents. More than half of the book is occupied with the parallel tables of logarithms and squares, of feet, inches and fractions of inches varying by ½ in. from zero to 50 ft. and by ⅛ in. from 50 to 100 ft. These values are all expressed in terms of feet and fractions thereof. For example, the parallel columns include the logarithm of the dimension and the natural square of the same. Thus, under the top heading of 3 ft. the column at the left gives the inches and fractions thereof in excess of 3 ft. So for 3 ft. 0¾ in., for instance, we have the logarithm of 0.54504 and the square as 12.3047 sq. ft.

This is followed by a table of angles and logarithmic functions. In this table are given the logarithms of the sine, cosecant, tangent, cosine and secant, with the angle, for all bevels in which the natural tangent varies by thirty-seconds of an inch and the base or radius is a constant of 12 in.

The first part also contains a multiplication table of rivet spacing, in which the spacing varies by eighths of an inch

from 1½ in. to 6 in. and the number of spaces from one to 30. Finally there are the decimal equivalents of a foot varying by thirty-seconds of an inch. The second part contains the ordinary tables of the logarithms of numbers, of logarithmic functions, of natural functions, sines, cosines, tangents, etc., the ordinary trigonometrical formulas, and, what is rather unusual, a repetition of the table of decimal equivalents of the foot found in the first part, the reason or necessity for which are not quite apparent.

Letters to the Editor.

THE COST OF DEMURRAGE AND OF PER DIEM.

New York, April 15, 1909.

TO THE EDITOR OF THE RAILROAD AGE GAZETTE:

A contrast is sometimes drawn between the 25 cents per day which railways pay each other for the use of each other's cars and the \$1 per day which shippers and consignees pay the railways under the demurrage rules, and the point is made that the railways should not charge the public more than they charge each other. The usual answer to this argument is that the per diem is a reciprocal charge and can be put at this low figure because it is only available for car owners. The difficulty with this argument is that some railways are not car owners, that others do not supply their full share of cars, and lastly, that as the per diem is settled on balances, it only applies in cases where the car relation is not reciprocal.

The real answer to this argument is the fact that railways pay each other more per day for the use of cars than they exact from the public. This may sound like a paradox, but when you consider the fact that 48 hours free time is allowed to shippers and consignees, and often very much more than this, it will be seen that the charge of \$1 a day, which is the occasional charge made only when cars are held over the free time, amounts to very much less than the per diem charge when compared with the total delay. The method of computing free time makes the average payment by the public very small.

For instance, if a railway borrows a car from another for two days it has to pay 50 cents; if a consignee or shipper holds a car two days only, he pays nothing. If he holds it three days, including a Sunday, it costs a railway 75 cents, while the consignee pays nothing. If a car arrives after 7 a.m. the free time begins next morning. The consignee holds the car three days for nothing; the railway pays 75 cents. If the car arrives after 7 a.m. Saturday the consignee can hold it free till Wednesday morning, four days; the railway pays a dollar.

If a railway holds a car three days it pays 75 cents; if a consignee holds a car for three days for loading or unloading he will pay \$1, or 33 cents a day, for the whole period. This is, of course, larger than 25 cents, but such a small proportion of cars are held over the free time that in the aggregate the payment by the public is less than one-half the per diem rate.

There are no figures available covering the whole of the country, but four of the car demurrage bureaus report both detention and charges, and it will be seen that in each one the collection per day is very much less than the per diem charge. The bureaus thus reporting cover portions of the north, south and the central part of the country.

Figures Taken From Four Demurrage Bureaus, Showing Both Detention and Demurrage Charges.

Cars handled.	Days detention.	Average detention.	Charges.	Average charge—	
				Per car.	Per day.
751,927	1,126,732	1.50	\$188,411	\$0.25	\$0.17
363,130	595,533	1.64	40,640	.11	.07
326,385	398,915	1.22	59,083	.18	.15
718,005	1,256,677	1.75	159,573	.22	.13
2,159,447	3,377,857	1.56	\$447,707	\$0.21	\$0.13

That these are not exceptional cases is shown by the fact that the average detention for all the bureaus reported to the American Association of Car Demurrage Managers is, for the year 1908, 1.79 days, while the charges of the two largest bureaus, those of Pittsburgh and Chicago, show for the year

1908 an average charge per car of a little less than 22 cents; this is at the rate of 12 cents a day to the public, as against 25 cents to the railway.

It will be seen from the above that the railways are really more liberal to the public than to each other.

ARTHUR HALE.

THE RAILWAYS OF BRITISH COLUMBIA.

Montreal, Canada, April 8, 1909.

TO THE EDITOR OF THE RAILROAD AGE GAZETTE:

In your issue of April 2 you print under the heading "The Railways of British Columbia," an article which I consider quite misleading.

Speaking of the Grand Trunk Pacific, you say: "It is stated that there is considerable friction between the English directorate of the Grand Trunk and the directors of the Grand Trunk Pacific, which is a Canadian corporation."

That is like a man having words with himself, for the two roads are directed by the same man; in other words, the Grand Trunk Pacific is the child of the Grand Trunk. The President, Sir Charles Rivers-Wilson, G.C.M.G., C.B., is a director of the Grand Trunk Pacific.

Charles M. Hays, who originated the idea of the Grand Trunk Pacific, is Second Vice-President and the head of the Grand Trunk on this side the Atlantic, and is also President of the Grand Trunk Pacific. Mr. Smithers, Vice-President of the old company, is a director of the Grand Trunk Pacific, and many—a majority, in fact—of the Grand Trunk Pacific directors are officers of the Grand Trunk.

Of Prince Rupert you say: "It is not by any means the ideal port and town site that it was believed to be when it was first selected." Surely the man who wrote that could never have seen Prince Rupert. The site is all that could have been hoped for, and as for the harbor, it is infinitely better than the management had any reason to hope for.

This is not merely a railway terminus or a railway port; it is to be a great port of the Dominion of Canada, for the development of which the Dominion government is spending a great deal of money. One-quarter of the town site is owned by the Province of British Columbia, and the Provincial government is at this moment spending nearly a quarter of a million building roads and sidewalks.

When the question of the Grand Trunk Pacific was before the public some four or five years ago the Liberal government appealed to the country, and the country voted something like two to one in favor of the project. This is a national affair, this Transcontinental Railway, and they have come to look upon it here in Canada as a thing to be proud of. Indeed, this is the first hint, so far as I have seen, in the public print that there was any disappointment in Prince Rupert. When the Panama canal is completed this will be the natural easy outlet for the wheat of the Canadian West bound for Liverpool.

The soundings and surveys have shown that in this magnificent harbor, 1 to 2 miles wide and 14 miles long, the largest ocean liners may manoeuvre, and at the same time there is not an acre where they may not find anchorage. As a matter of fact all disinterested persons who have seen the new port pronounce it perfect.

As to the progress of the work, you must keep in mind that Canada is building for the future, and building a line, the like of which has never been attempted, in the first instance, on this continent. The Grand Trunk Pacific will cross from ocean to ocean without a single mile of mountain grade; in fact, the grade through the mountains is precisely the same maximum mount per mile as the prairie section—four-tenths of 1 per cent.

It will be possible for the Grand Trunk trains to cross the continent, saving from half a day to a day and a half over existing transcontinental lines. Its locomotives can take from four to eight times the tonnage from the fields of the Middle

West to the Pacific taken to-day by other lines, and when arriving at its Pacific port it will be nearly five hundred miles nearer Yokohama than any other Pacific port.

The wonderful resources of Canada have made the Canadian Pacific one of the great railways of the world, and they will justify the building of this additional high-class line. At all events that seems to be the conviction of the Grand Trunk management and of the Dominion government, who are assisting the builders.

CY WARMAN.

A NEW DEPARTURE IN FLEXIBLE STAYBOLTS.

Hexham-on-Tyne, March 1, 1909.

TO THE EDITOR OF THE RAILROAD AGE GAZETTE:

Evidently H. V. Wille* is not aware that his investigation (in the reproduction of which, by the way, the compositor has dropped the index of the third power from the value of L in the second equation) was applied to the design of staybolts about eighteen years ago, and proposals for a simple form of flexible stay were then made.

The assumption of fixity at one end and freedom at the other, and the indication of buckling along straight lines of deflection, are not perhaps intended to present literally the actual conditions.

If ordinary fireboxes when subjected to cold water pressures imposed only tensional stresses on the stays, leaving movements due to expansion alone to be dealt with by deflection of the bolts, there would be strong reason for the adoption of a flexible design. But this is far from being the case in practice.

The Belpaire type of box is usually considered to be the most perfect as regards the direct balance of the pressures on the inner and outer fireboxes, yet it is evident that there are not inconsiderable areas of flat plate, at the parts where the crown and sides merge into the circumference of the barrel, which have no counterpart in the shape of the inner box, the adjacent staybolts exercise a resultant pull tending to distort the tube plate along the vertical and horizontal diameters, while they are necessarily bent by the resulting movement of the plates. Not unfrequently the flat plates of the shell are allowed to terminate beyond the length of the flat plates of the box, distortion being inevitable before equilibrium is attained.

The so-called radial staying of the crown sheet, so frequently adopted in America, affords direct equilibrium only along the top where the stays are normal both to the box and to the shell plate, and there is consequently no tension in the latter. In passing along toward the shoulders of the box the balance is no longer simple and direct, the internal pressure being in excess of the pull exerted by the stay; the tension in the shell plate increases from stay to stay as the corners of the box are approached, and this variation of tension involves a tangential resultant at the head of each of the stays, which produces a bending moment reaching its maximum value in the outer rows of roof stays and upper rows of side waterspace stays.

In some modern Italian locomotives, and to a less extent in German practice, the back end plate of the box is sharply inclined, while the shell plate is given less inclination, thus producing a divergent waterspace, which should be excellent for promoting circulation and for providing stays of greater length and flexibility just where the expansion is greatest. Yet the stay breakage is frequent, and is to be accounted for by the fact that though the corners of the box and of the shell are concentric at the foundation ring they rapidly diverge from that condition, and the stays next the back corners are exerting an outward pull which is sufficiently intense to account for cracked and distorted plates and broken stays.

In German practice the back end plate is sometimes secured to the shell by a reversed flange, a form of connection which is excellent when applied to an end of circular form, but

capable only of giving a short life with relatively high cost of maintenance when used with the straight waterspace legs of the locomotive firebox. The difference between the areas of the inner and outer flat surfaces is very great, and the flexure of the side plating near the back end rivets gives rise to grooving, which, with the frequent occurrence of cracked corners and leaky or broken stays, demonstrate that departure from correct principles is the chief factor contributing to the growth of maintenance charges.

The adoption of flexible stays in situations where the equilibrium of the normal forces involves bending moments on the bolts can only preserve the latter by permitting increased distortion of the plating. The full economical value of flexible staybolts, whether of Mr. Wille's ingenious high tensile pattern, or otherwise, can only be fully demonstrated by applying them to fireboxes of technically correct design, a minority of those in use with modern locomotives of high capacity.

J. D. TWINBERROW, A. M. INST. C. E., M. I. MECH. E.

RAIL JOINTS.

Nice-Cimiez (France), April 6, 1909.

TO THE EDITOR OF THE RAILROAD AGE GAZETTE:

The appearance of high rail joints and of high spots at the middle portions of the rail on the tracks of one of the eastern roads using the deep girder type is in so far instructive as it shows the difference in the effect of the wheel on molecular and on mechanical connection.

The efficiency of the latter depends on the tightness of the bolts and on the original shape of the surfaces of contact.

As long as the bolts are loosened and the shape of surfaces of contact altered, mechanical connection, supposed to replace the lack of molecular connection, remains useless.

The able presentation of the facts proving the uselessness of equal stiffness of the trailing and of the facing rail end in the article, "Einige Oberbau Fragen," in the *Organ*, No. 10, 1908, shows that homogeneous tracks are an illusion, confirmed by the necessity to sight for low spots and to raise them wherever they can be detected along the rail.

As stated in my letter, published in your issue of Jan. 22, 1909, it remains to be seen which growth of the bar, downward or upward, will outgrow the other. The original mechanical connection of the fish rail hardly will be subjected to premature alterations, thus proving that the rail ends, instead of being stiffened, must be relieved from the part of pressure exceeding their carrying capacity.

MAX BARSCHALL.

RAIL BREAKAGES.

Baltimore, Md., April 17, 1909.

TO THE EDITOR OF THE RAILROAD AGE GAZETTE:

Referring to the question of rail breakages, and especially to the letter of A. G. Wells on page 808 of the April 9 issue, the view expressed by Mr. Dudley and substantiated by Mr. Wells' experience as regards the quality of the sub-grade being responsible in large measure for rail breakages, is an interesting sidelight on the question.

The writer does not believe that, ordinarily, in the investigation of a given rail breakage enough attention is given to the question of tie spacing or to whether or not there were any loose or "pumping" ties in the vicinity of the failure. I have noted instances on a piece of track laid with 90-lb. rail and subjected to heavy traffic, where the ties were sometimes more than 30 in. between centers, and one space actually measured was practically 36 in. It would also be interesting to note whether or not the broken rail showed any evidences of having been injured by locomotive driving wheels slipping when starting the train, or if the flange of the rail had been nicked by a misstroke of a spike maul when the rail was laid.

J. W. RUPERT,

Inspector, Baltimore & Ohio.

*See page 307, *Railroad Age Gazette*, February 12, 1909.

RAILWAY AND COMMERCIAL SITUATION IN JAPAN.

Through courtesy of Professor Emory R. Johnson, we are enabled to publish the following transcript of a letter sent to him by Dr. Jinjiro Ito, Professor of Commerce in the Waseda University, Tokio. Dr. Ito took his Ph.D. from the University of Pennsylvania last June.

Waseda University,
Tokio, Japan.

Since writing to you last many economic problems have come into the foreground in Japan which call for special attention by students of commerce and transportation. The most important of these are the questions of shipping subsidies and the reorganization of the railway administration in Japan. I leave out of consideration entirely the still important and very interesting political change in China.

Business has been very dull for some time in the Far East, and the situation was made worse because the ports in northern Japan, Russia and northern China were closed toward the latter part of November. Many owners had to lay up their vessels, while some were run merely to keep their financial machinery going despite a heavy loss due to the lack of cargo. Numerous vain attempts have been made to improve the situation by appealing for Government aid, and by scheming for a combination of owners, etc. A few days ago the papers reported a radical reform at the Mitsubishi dock yard at Nagasaki, where a large number of employees were discharged. The outlook is not very encouraging.

There has been much talk of the abuse of the nation's money in the subsidies which, the papers claim, have been useless to the merchant marine of Japan; and an almost unanimous cry has been raised by the papers for the curtailment of the amount of money devoted to that purpose. At this moment, however, there is little likelihood of any change being introduced in our shipping policy, although a new subsidy will very probably be given to a South American line by transferring the money which would otherwise go to the same owners under the item of subsidy to the Frisco line.

Baron Goto, one of the most business-like statesmen in the present cabinet, seems to be determined to give a final stroke to the nationalization of railways in Japan. A few years since many private roads were taken over by the Government, and attempts were made to unify the various systems which, of necessity, differed in their equipment and organization, serving as they did various sections of the country. Local needs were disregarded, and when they were given due attention it was only through red tape—inquiry and order going back and forth many a stage on its way—in the process of which much time was wasted, and when the order was at length issued new conditions governed the situation and the rules were old again.

In view of this difficulty a reorganization has been proposed, the order being issued to-day. A new board with an autonomous power has been created—the Railway Bureau, which had been in the Department of Communication, and thus subject to the Minister of Commerce, and has been detached from the department and made subject to the Prime Minister. The board has power both to operate its own road and control private roads, of which there is very little mileage at present. The entire system of Japanese railways, except those in Formosa, is divided into five divisions corresponding to the territorial division of railways prevailing at the time of private ownership. The superintendents of the divisions are given a wide range of freedom and thus can manage the business of their own territory without recourse to the central board, which deals with only those questions which affect the entire system. It remains to be seen how the new system will work. You will be pleased to hear that this change has given Mr. Kinoshita another chance for promotion. He was made the traffic manager of the board.

Board of Railways.

(South Manchurian Railway Company coming under the control of the Board)

General Administration.
Construction.

Transportation { Chief secretary.
Traffic manager.
Chief engineer for operation.
Chief engineer for maintenance.
Chief engineer for car construction.
Electric engineer.
Steamship manager.

Accounting
Bureau of Railway Investigation.
Divisions (at present five, subject to increase).

THE MAXIMUM WEIGHTS OF SLOW FREIGHT TRAINS.*

BY C. S. BISSELL, M.A.M.SOC.C.E.

It is hardly necessary to mention the great and growing importance of the subject of train weights. Study of the problem has given rise to many different forms of investigation which are constantly appearing in the railway journals and which are indicative of greater refinement in the making up of trains in the future. Most writers have endeavored to treat the subject in its entirety, comprehending the operation of both slow and fast trains, whereas the object of this paper is to present only the case of slow freight trains, and to outline briefly the history of the various steps which led to the conclusions finally reached.

The writer was called upon to formulate some method of estimating operating expenses, over proposed revisions or projected lines not constructed, such as would permit of the intelligent comparison of expenses on two or more projects or routes of haul. The locomotive was of a type weighing, with its tender, 168 tons, of which 173,000 lbs. rested on the driving wheels; and the train was to consist of cars weighing 20 tons each when empty, with a capacity of 50 tons. The speed was not to exceed 10 miles per hour on ruling grades, and no benefit derived from momentum was to be considered in fixing the train weight. The resistance due to curvature was to be allowed for by compensating the ruling grades at 0.05 per cent. per degree of curve.

The first principle of train resistance, namely, that a given train weight confined in a few cars requires less tractive power to move it than the same weight composed of many empty cars, led the writer to a form of equation involving the relation between the dead weight and the lading of the cars, which is evidently the same as if the average car weight or the actual number of cars had been used.

The tractive power of the locomotive was determined as the average amount which would usually be developed within the adhesive power of the driving wheels, considering that atmospheric conditions and steaming qualities remained practically constant at normal values. The tractive power was to be reduced by the proper amount for a constant speed of 10 miles per hour.

With these ideas, which indicated the general form of the equation, the paper† on "Virtual Grades for Freight Trains" by A. C. Dennis, M. Am. Soc. C. E., was consulted, with the result that the train resistance was taken at 4 lbs. per ton of train weight for full cars and 9 lbs. per ton for empty cars. Also, from this paper, was taken the reduction of 13.7 per cent. in the tractive power for the speed of 10 miles per hour.

Table 1.

Compensated grade, percentage.	Gross train weight in tons.	Compensated grade, percentage.	Gross train weight in tons.
0.300	3.292	1.260	953
0.655	1.898	2.130	555
1.055	1.238		

The hauls in Table 1 are from the records of the Pennsylvania Railroad Company, and represent a fair average of

*From the February, 1909, *Proceedings of the American Society of Civil Engineers*, page 141.

†*Transactions*, Am. Soc. C. E., Vol. L, p. 1.

actual train weight for one locomotive of the type described, for a speed of 10 miles per hour.

Using the values in Table 1, and increasing the train capacity 10 per cent. for overload, as a limiting maximum, the coefficient of tractive power was established at 0.232; and the complete expression for tractive power then became $0.232 \times 0.863 \times$ the number of pounds on the drivers, or $0.2 \times$ the number of pounds on the drivers, in which the 0.863 is the complement of 13.7 per cent. Introducing now the factor for train resistance, and denoting the ruling grade percentage by g , the general equation is obtained:

$$\left. \begin{array}{l} \text{Tons of} \\ \text{train weight} \\ \text{behind tender.} \end{array} \right\} = \frac{0.2 \times \text{pounds on drivers.}}{\frac{\text{Weight loaded on train.}}{1.1 \times \text{Capacity of train.}} + 20 g} - \left\{ \begin{array}{l} \text{Tons of} \\ \text{locomotive} \\ \text{and tender.} \end{array} \right\} \dots (1)$$

in which the "Capacity of train" is the sum of the capacities of the cars, and all tons are 2,000 lbs. in weight. For the particular case in hand, the weight on drivers is 173,000 lbs., and the weight of locomotive and tender is 168 tons; hence, with cars of any class loaded to the maximum, the equation assumes the special form:

$$\text{Net tons behind tender} = \frac{34\,600}{4 + 20 g} - 168.$$

Using this equation and the values of g for the hauls given above, from which the coefficient of tractive power was derived, it is found to give the train weights within about the weight of one empty car, except in the case of the fourth haul, which it makes 64 tons too high; but, as the last haul is only 19 tons too high, it is reasonable to assume that the equation represents safe values in the case of this example. Also, it is reasonable to assume that since for empty cars the train resistance is 9 lbs. per ton of train weight, the values intermediate between 4 and 9 lbs. per ton will be given correctly by the equation for all partial loadings of the train. It will be noted that for a train of empty cars the equation becomes:

$$\text{Net tons behind tender} = \frac{34\,600}{9 + 20 g} - 168.$$

Because the purposes for which this equation was derived are usually expressed in terms involving an annual paying tonnage to be moved, the form of the general equation is believed to present special advantages, and from it a table may be formed showing the tons of lading and the number of cars in the train, which is convenient in estimating operating expenses; and the possibility of using it in making up trains is also evident.

The equation has thus far fulfilled the requirements for which it was designed, but suggestions have been made which show that it can be greatly improved in point of accuracy of form and adaptability in making up trains.

One objection to the form is found in the fact that the car resistance per ton varies in a straight line, or, in other words, that it is proportional to a constant increment of lading. Every indication in nature goes to prove that probably the variation should be in proportion to an increment of lading which is constantly increasing, or to a decrement of similar character; in short, it should represent a curve instead of a straight line when depicted graphically. The grade resistance, $20 g$, is evidently mathematically correct, being a simple case of a weight on an inclined plane; but the further suggestion of reducing the value of the tractive power for the grade involved with the dead weight of locomotive, tender and caboose, has a great advantage in point of accuracy over

the method of simply subtracting such dead weight as indicated in the above equation, particularly in cases where the tractive power is determined by a dynamometer car. For general use, it seems advisable to express the relation of the train weight to the number of cars as the average total car weight. It can readily be seen that if the four axles and eight wheels of an ordinary car are identical in size and weight, then the total weight of the train divided by the number of cars is an average car weight, which is a true measure of the resistance per car. If the condition is not realized absolutely, the average car weight will be affected by an inconsiderable amount in the case of an ordinary mixed train.

In view of these considerations, the equation must necessarily be expressed in a form somewhat different from that given above, and, for this purpose, the writer makes use of the following values, which are selected from a number of tests made with a dynamometer car, in which R is the resistance of a train, in pounds per car, and W is the average weight per car, in tons of 2,000 lbs., for a speed of 10 miles per hour:

Table 2.

Point	R (lbs.).	W (tons).
A	160	20
x	195.7	40.2
y	199.0	42.8
B	216.0	72

Referring to Fig 1, upon which the points, A and B, are located, it is clear that the resistance per car will decrease from B to A, and will become zero when the number of cars becomes zero. Hence the line of variation must pass from B through A and through the origin of co-ordinates, zero. It must, therefore, be a curve; and such a curve is represented by the equation:

$$R = \frac{a W}{b + W};$$

its particular form for this case being,

$$R = \frac{249.6 W}{11.2 + W},$$

which is the line, S T, in Fig. 1. Plotting the points, x and y , it is seen that they agree closely with the values given by the equation, thus confirming the assumption that the resistance per car varies as a curved line of this character.

Dividing the values of R by the corresponding values of W , and plotting the results to the scale on the right of Fig. 1, develops the curve, M N, of pounds per ton of train weight.

It is now possible to formulate the equation:

$$\text{Tons of train weight behind tender} = \frac{P - 20 g m}{\frac{a}{b + W} + 20 g} \dots (2)$$

in which P = the pounds of tractive power at the drawbar; m = the weight, in tons, of the locomotive and tender; a and b are constants; W is the average weight per car, in tons; and g is the grade, in percentage. The tractive power, P , is here reduced by $20 g m$ (where the weight of a caboose may be included in m if desired), instead of subtracting the dead weight, m , after the division has been made. Substituting the known terms taken from Tables 1 and 2 and those derived for Fig. 1, an average value of P is found to be 32,100 lbs., and therefore the equation for train weight for this particular case becomes:

$$\text{Tons of train weight behind tender} = \frac{32\,100 - 3\,360 g}{\frac{249.6}{11.2 + W} + 20 g}$$

This equation does not agree with the values in Table 1 as closely as do the results from Equation 1, but it is more rational in form, and is adapted to use in connection with records taken with a dynamometer car, from which the tractive power, P , and the constants, a and b , can be readily determined by experimental trials for any particular forms of locomotives or cars.

For the purpose of making up trains, an equation similar

to the above can be expanded into a table. Thus, for any particular division of the railway, the ruling grade, g , is known; assuming it to be 0.5 per cent., for example, the equation becomes:

$$\text{Tons of train weight} = \frac{30\,420}{\frac{249.6}{11.2 + W} + 10}$$

From this may be prepared for all car weights a form similar to Table 3, which shows only three values of average car weight. The reduction for temperature, of course, must be determined by past experience. A similar table, prepared for each class of locomotive on the division, can be used for making up trains by a yard-master of very mediocre intelligence. The process of taking the continued sum of the car weights until the total indicated in the table is approximately reached, and then dividing the result by the number of cars to obtain the average car weight, is a simple one. The difference of a few cars more or less is then made up,

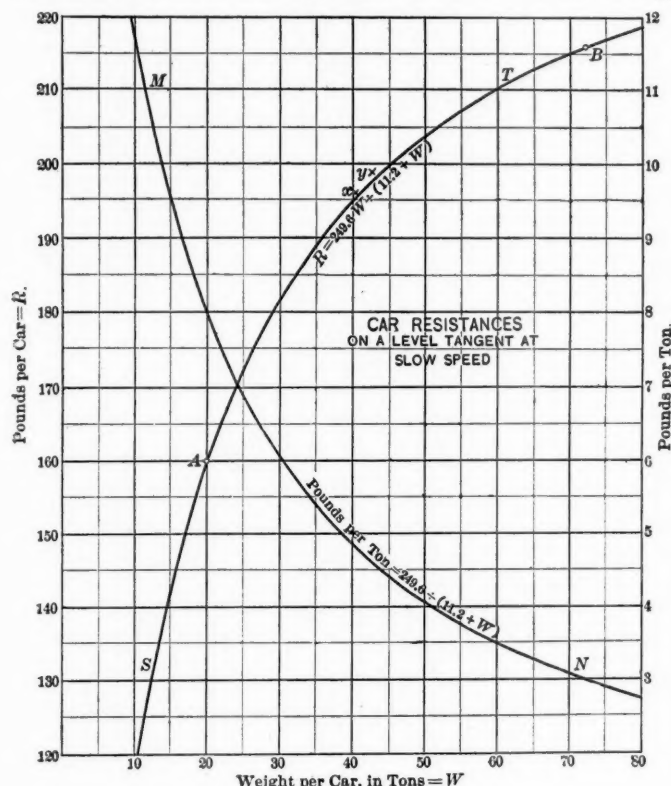


Fig. 1.

and the total train weight of the completed train is finally checked by a repetition of the process.

Table 3.

Average car weight.	M. & N. Division—Locomotive Class H.				
	Train weights for various temperatures				
	Summer.	45°—25°	25°—5°	Below 5°	Emergency
40 tons	2,046	1,840	1,636	1,535	1,023
41 "	2,058	1,852	1,646	1,544	1,029
42 "	2,071	1,864	1,657	1,553	1,036

This example of the manner in which trains may be made up is given to illustrate the practicability of dispensing with a "car factor," consisting of a predetermined number of tons to be added to each car in the train. Such a car factor is in reality a fictitious weight, and its use introduces the element of a "straight-line variation" in reaching the final result, which is questionable in point of accuracy. The following quotation is taken from "Tonnage Rating," an article by F. W. Thomas*:

Mr. Thomas says: "The most difficult problem after the rating has been ascertained and proven is to express the rating intelligently and in such a form that the dispatchers, yard-masters, foremen or switch crews and conductors can understand and easily interpret the rating sheets.

"The most difficult thing to impress upon those interested is the fact that the rating is often governed by the number of cars in the train; the greater the number of cars, the greater the rolling resistance. In the eyes of the average trainmaster and dispatcher a thousand tons, whether confined in 20 cars or in 50, is a thousand tons."

"You will note * * * that the maximum rating is shown in cars weighing 50 tons, and for every car added to the train above this given number of cars a reduction from the maximum rating must be made of from four to five tons. * * * I cannot say that this reduction is based on any fixed rule, beyond, as mentioned above, that it is the fruit of long investigation and a series of tests." * * *

The writer thinks that Mr. Thomas intended to say, in the instance above, "the greater the number of cars the greater the rolling resistance per ton of train weight," which is usually difficult to make clear.

As a matter of fact, the determination of the car factor is sometimes based on a "fixed rule," or rather a carefully wrought out series of experimental tests put into a rational mathematical form. This form usually is developed by equations, some of which represent straight lines, but whether or not this be true, the unfortunate fact remains that the use of such a far factor, when derived, constitutes a constant increment, thus introducing a form of straight-line variation into the calculation.

It may be asked, what objection can be made to such a variation, and in answer the writer appeals to the reason of those who are students of the problem here presented. Natural forces represented graphically, almost without exception, are forms of curves. The construction of a train is artificial, but the forces developed by the movement of the train are natural in their characteristics; and continued study brings with it the growing conviction that the graphics in this problem should be curves rather than straight lines. Granting this, the use of the car factor must be dispensed with, and a rigidly curvilinear method or equation must be formulated. If we conceive of a level railway tangent as an arc of 4,000 miles radius, the center of which is the earth's center, then Equation 2, as given above, is strictly curvilinear in its components and in its entirety; but if this conception appears to violate the sense in which the quantity "20 g" is used, there still remains the argument that grade is an artificial and not a natural element of force in this problem.

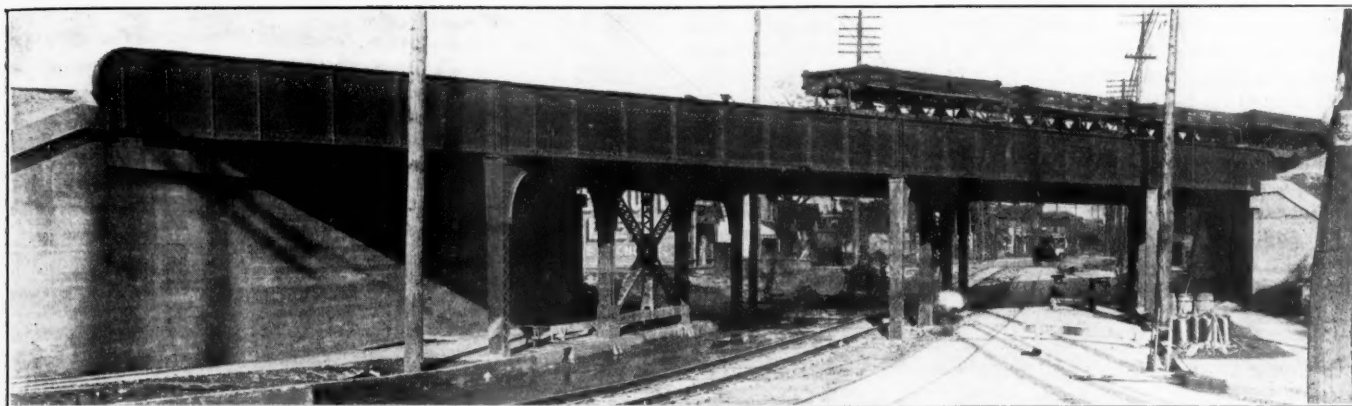
The economic issues dependent upon a true determination of maximum train weights, especially for slow freight trains, are of such grave importance that the writer feels justified in stating that any criticisms or suggestions which will throw more light on the subject will be welcomed by the majority of railway men.

The data upon which the foregoing developments are based are believed to represent normal conditions. They are the results of many tests, and of careful selection and reduction. In every case, however, they apply only to the slow speed of from ten to seven miles per hour. The equations are given to show only the form of variation, since it is apparent that the constants in them must be derived from experimental tests.

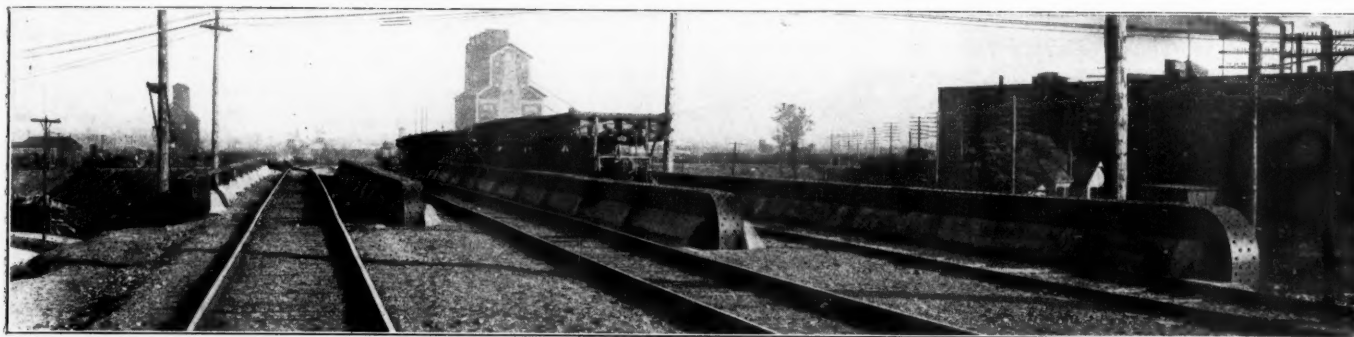
ELECTRIC HEADLIGHTS IN NORTH CAROLINA.

The legislature of North Carolina has passed a law requiring electric headlights to be used on all road locomotives within four years. The law specifies an "electric or power headlight" of at least 1,500 c.p. measured without the aid of the reflector. Of the engines of any company not now equipped, one-fourth must have the lights by April 1, 1910; one-fourth the next year; one-fourth the next, and all by April 1, 1913. The law does not apply to engines regularly used for switching, nor to those used only in the day time, nor to engines going to shops for

*American Engineer and Railroad Journal, April, 1907.



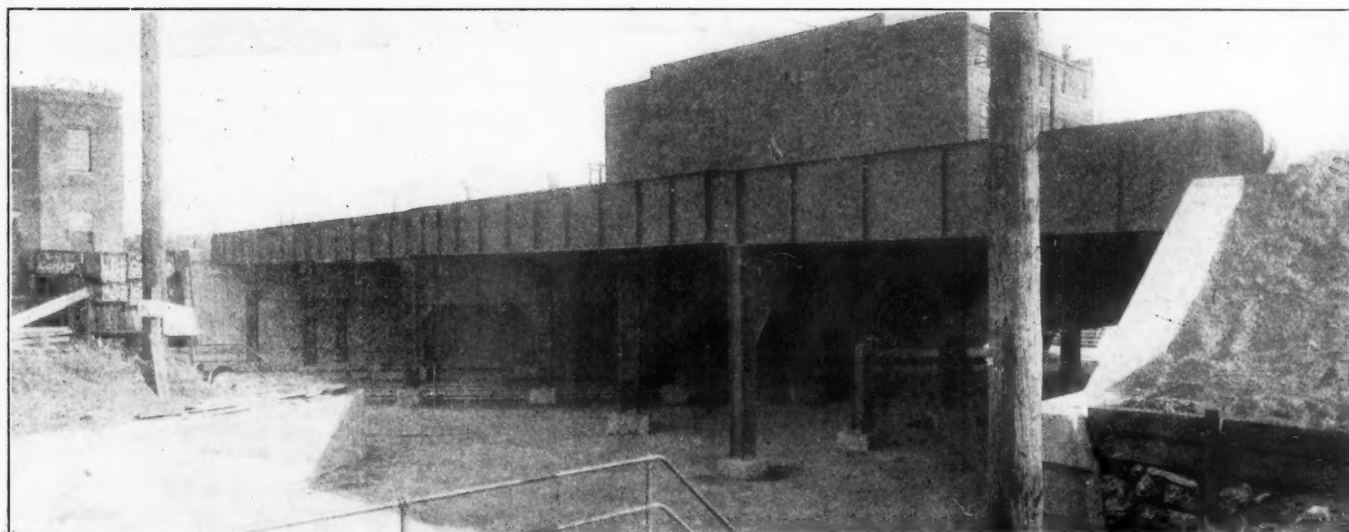
West Washington Street Bridge.



Top View of West Washington Street Bridge.



Freight Tracks Bridge over Kentucky Avenue.



Bridge over Kentucky Avenue and Missouri Street.

supported on transverse girders and columns along the curb line in the street. A street railway in Kentucky avenue necessitated a vertical clearance of 15 ft. 9 in. To get this, the tracks were raised 10.5 ft. and the street lowered 8.7 ft., the approaches having a 4 per cent. grade. Cross-sections and a photograph of this bridge are shown in the illustrations.

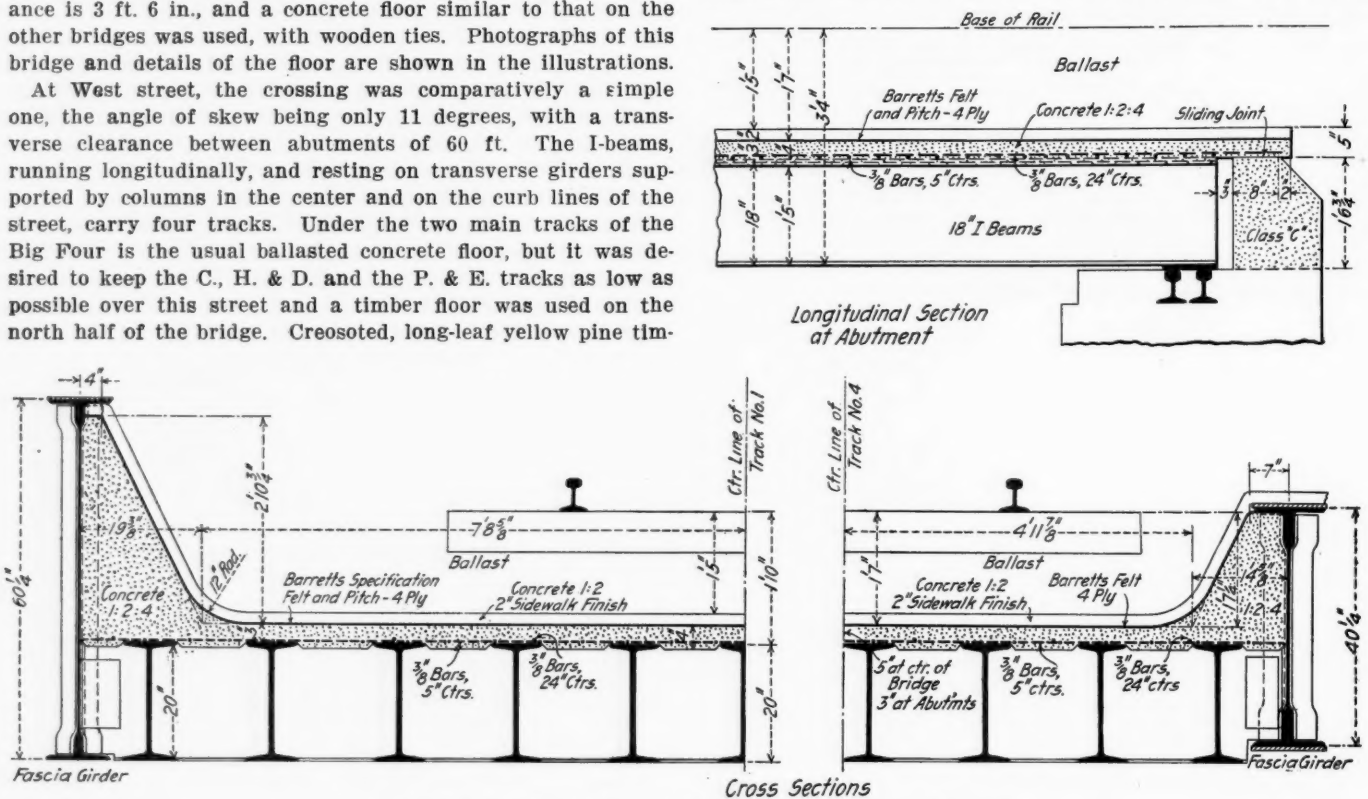
About 200 ft. northeastwardly from this bridge, Kentucky avenue is also crossed by two freight or running tracks of the Big Four, and the full depression of the street is continued under these tracks. They are on an 11 degree curve at this point and the distance between abutments is 90 ft. A very shallow floor was used in the span over the street railway tracks, the distance between base of rail and clearance line being only 18 in. To accomplish this, heavy Bethlehem steel I-beams were used, running transversely and spaced far enough apart to permit Carnegie steel ties to be placed between. The ties were inclined enough to take care of the necessary super-elevation of the outer rail, and were concreted solidly in place. On the end spans, the distance between base of rail and clearance is 3 ft. 6 in., and a concrete floor similar to that on the other bridges was used, with wooden ties. Photographs of this bridge and details of the floor are shown in the illustrations.

At West street, the crossing was comparatively a simple one, the angle of skew being only 11 degrees, with a transverse clearance between abutments of 60 ft. The I-beams, running longitudinally, and resting on transverse girders supported by columns in the center and on the curb lines of the street, carry four tracks. Under the two main tracks of the Big Four is the usual ballasted concrete floor, but it was desired to keep the C. H. & D. and the P. & E. tracks as low as possible over this street and a timber floor was used on the north half of the bridge. Creosoted, long-leaf yellow pine tim-

ber was used. The street was depressed about 5 ft., with 4 per cent. approaches, and crossed by a three-track, four-span, through girder bridge having an I-beam and solid concrete floor carried by girders for each track. The total length, out to out, is 154 ft. The transverse clearance between abutments is 80 ft., and the vertical clearance is 15 ft. 9 in. The columns are on the center and curb lines of the street. To handle the traffic, temporary detour mains were built and were in service until two of the three elevated tracks could be put in operation.

Except at the street crossings, the tracks are supported on earth fills, the material being pit strippings delivered in trains of 12-yd. dump cars from Eagle creek, about eight miles west. This material was sandy, and therefore readily adaptable to the method used in making the fills. The greater part of the filling was done by raising an unloading track, from which the banks were widened after the track was raised to grade.

The concrete floors of the bridges consist of flat slabs of reinforced concrete about 3 in. thick, built on top of the



Floor for Bridge over Kentucky Avenue and Missouri Street.

bers, 6 in. by 12 in., were laid flat transversely on the I-beams, the joints caulked with oakum, and the entire floor then covered with a coating of hot pitch and gravel to prevent fire. The timbers are held in place from below by lag screws engaging the upper flanges of the I-beams. Malleable iron plates provide bearings for the rails, which are secured with steel clips and screw spikes. The vertical clearance above the roadway at this crossing is 12 ft., the tracks being raised about 12 ft. and the street depressed 3.5 ft., with 2 per cent. approaches.

West of White river, there was a separation of grades at West Washington street. This street is crossed at an angle of 38 degrees by one track of the C. H. & D. and two tracks of the Peoria & Eastern. There was a connection with the west end of the P. & E. repair yard and roundhouse at Washington street. As a result of the elevation, the yards had to be rearranged and rebuilt, and a new coaling station, cinder pit and water lines had to be provided to accommodate the connection of the yard at its east end. Owing to the great height to which it was necessary to raise the tracks—14 ft.—the grade change extended over a distance of about 4,000 ft., although a 1 per cent. westbound and 0.55 per cent. eastbound

I-beams, crowned to provide drainage, and troweled to a smooth finish. This lower layer of concrete was extended well up the sides of the trough or fascia girders, so that the waterproofing could be carried well up above base of rail. Expansion joints of 1/2 in. were made over each line of columns, the reinforcing bars and concrete being stopped off square and the space between slabs calked with oakum and pitch. Fourply Barrett specification felt was then applied over the entire slab, with pitch between all layers, and was carried down on the back of the abutments to a point somewhat below the bridge seat. On top of this was put a 2-in. protection layer of 1:2 concrete, which was also carried up the sides of the girders and finished off flush with the upper flanges. No expansion joints were made in the waterproofing or protection layer, these being carried continuously from one end of the bridge to the other. Thus far, no leaks have developed, this method of waterproofing apparently being effective.

The work was done under the supervision of W. M. Duane, then Chief Engineer of the Big Four, and C. A. Paquette, Assistant Chief Engineer. J. B. Hunley, Assistant Engineer, was in immediate charge of the work.

RATES ON IRON AND STEEL—AMERICA AND GERMANY.

Opportunity for comparing the iron and steel rates of this country with those of the Government Railways of Germany is afforded in a report of the German iron and steel industry prepared for the Department of Commerce and Labor by its special agent, Charles M. Pepper. The report was prepared in compliance with an act of Congress of May 22, 1908, authorizing an investigation of trade conditions abroad. Much of the material contained in this report is being made a subject of comment in the debate now going on in Congress over the tariff bill.

The German government, through its control of railways as well as in other ways, has done much to foster the foreign business of the German steel manufacturing concerns, and in comparing the freight rates in that country with those made by our railways here the interest in the comparison is heightened by the fact that it affects a trade which is specially favored in Germany, whereas the rates on steel products here are fixed by the railways without any direct intervention by government authority, and merely in pursuance of the general policy of the railways of promoting industries by fixing rates which will stimulate traffic.

The German scheme of fixing rates on iron and steel products is thus stated in the Pepper report:

"In fixing the transportation rates ore is treated as primary raw material, the same as agricultural products, and is therefore given the lowest rates in the freight schedules. This treatment has been extended to the ores from the Meurthe-Moselle district in France. Iron and steel products come under special tariffs which have been devised by the government on the principle of encouraging the manufacturing industries."

The following tables, made up from data contained in the Pepper report and from figures obtained from the Pennsylvania Railroad, afford a comparison between our rates and those of Germany on steel and iron:

Freight Rates on Iron and Steel Products.

Place.	Miles.	Items.	Domestic rates per ton.	
			Germany.	U.S.
Cologne to Antwerp	132	Machinery	\$2.629	\$2.80
Duncannon, Pa., to Phila.	134	Other mfrd. steel.	2.217	1.50
		Billets	1.60	1.50
		Pig iron	1.60	1.15
Dusseldorf to Antwerp . .	115	Machinery	2.441	2.20
Chester, Pa., to New York	122	Other mfrd. steel.	2.067	1.80
		Billets	1.372	1.80
		Pig iron	1.372	1.40
Cologne to Hamburg	264	Machinery	3.292	2.80
Johnstown to Baltimore . .	262	Other mfrd. steel.	2.568	2.60
		Billets	2.424	2.00
		Pig iron	2.424	1.85
Cologne to Bremen	204	Machinery	2.52	3.00
Williamsport to Baltimore	197	Other mfrd. steel.	2.04	2.00
		Billets	1.726	1.70
		Pig iron	1.726	1.55
Dusseldorf to Bremen . . .	181	Machinery	2.256	...
Wilkesbarre, Pa., to Phila.	185	Other mfrd. steel.	1.824	2.00
		Billets	1.696	1.70
		Pig iron	1.696	1.60

Comparison of rates on pig iron shows lower rates here in all the instances cited than for similar distances in Germany. From Luxembourg to Bochum, a distance of 194 miles, the rate is \$1.272 per ton, against \$1.14 per ton charged here from Erie, Pa., to Etna, Pa., a distance of 212 miles. From Luxembourg to Dortmund, 206 miles, the rate is \$1.272, and from Erie, Pa., to Pittsburgh, 216 miles, \$1.14. The difference in favor of our rates on iron ore is equally striking in the case of other similar comparisons of rates.

In the case of pig iron, also, our rates are also lower in most instances for both domestic and export shipments, the slightly higher rate quoted from Chester, Pa., to New York over the rate from Dusseldorf to Antwerp for domestic shipments being more than offset by the fact that the former dis-

tance is greater by seven miles. A similar explanation attaches to the rate on billets from Dusseldorf to Bremen, and the only case therefore noted in this table in which the domestic German rate on billets is lower than the rate for a similar distance here is on shipments from Dusseldorf to Antwerp, where the German rate is directly affected by the availability of water transportation on the Rhine between these two points. The rates on machinery and other manufactured iron and steel also afford a number of instances in which the rates here are below the German rates.

BUSH TRACK CONSTRUCTION.

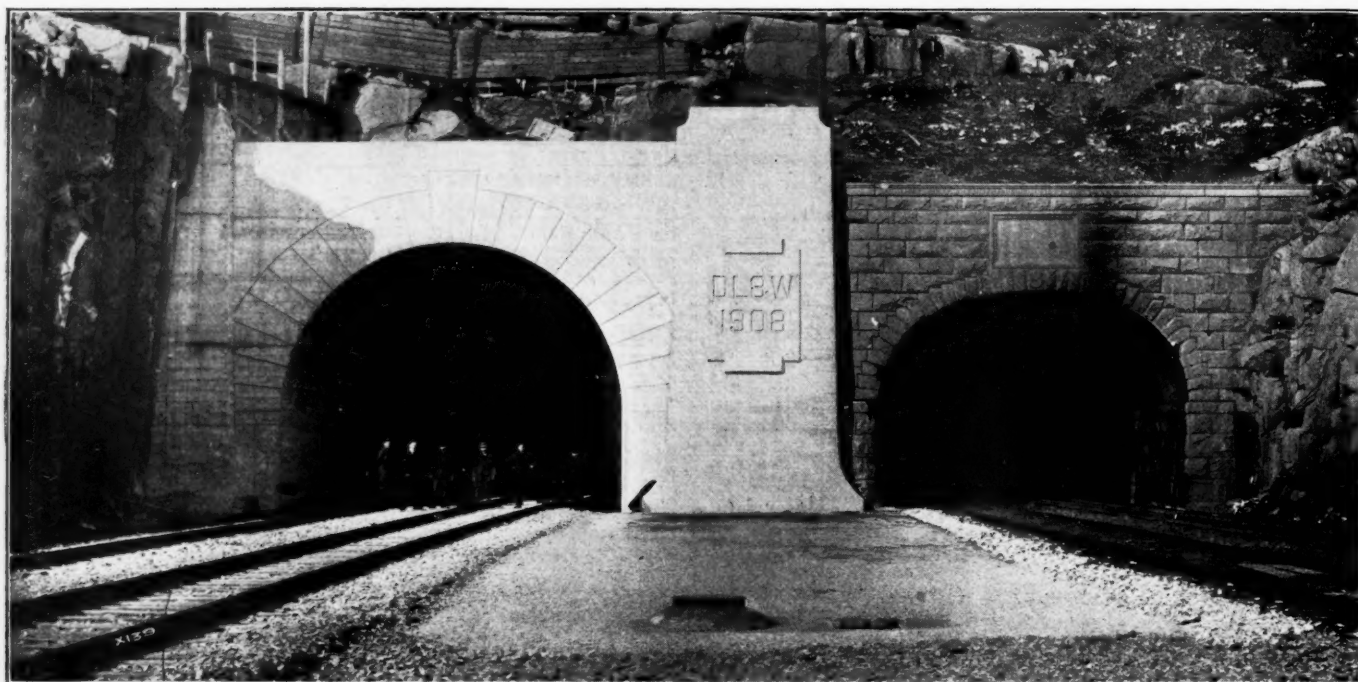
The track structure in the Bergen Hill (Jersey City, N. J.) tunnel of the Delaware, Lackawanna & Western was briefly described in the *Railroad Age Gazette* of November 6, 1908. It was invented by Lincoln Bush, then Chief Engineer of the Lackawanna, and now a consulting engineer in New York, who has patented the design.

The roadbed is of concrete laid on the rock bottom of the tunnel and reinforced by vertical rods between the tie blocks, to take care of shear in concrete between the blocks that might arise from creeping of track or from stress due to tightening wedges. The $7\frac{3}{4} \times 7\frac{3}{4}$ in. wooden blocks 2 ft. 6 in. long are set in the concrete and spaced 22 in. apart on centers for supporting the rails. The tie blocks are notched at the outer end to form a shoulder and are set in the concrete when it is built. The concrete fills the space made by the notch in the tie block and prevents the lateral shifting of the block. A tapered wedge block holds the tie block tight against the concrete and can be driven in to take up any looseness due to shrinkage or wear. There is a small filler block at the inner end of the wedge, which is to be pulled out when it is necessary to drive the wedge in further. The wedge is held in place by a lag screw extending about 2 in. into it through the guard rail, where the guard rail type of track is used. The guard rail is fastened to the tie blocks by lag screws and is also anchored to the concrete by anchor bolts. The rail is fastened to the blocks by lag screws and wrought iron clips.

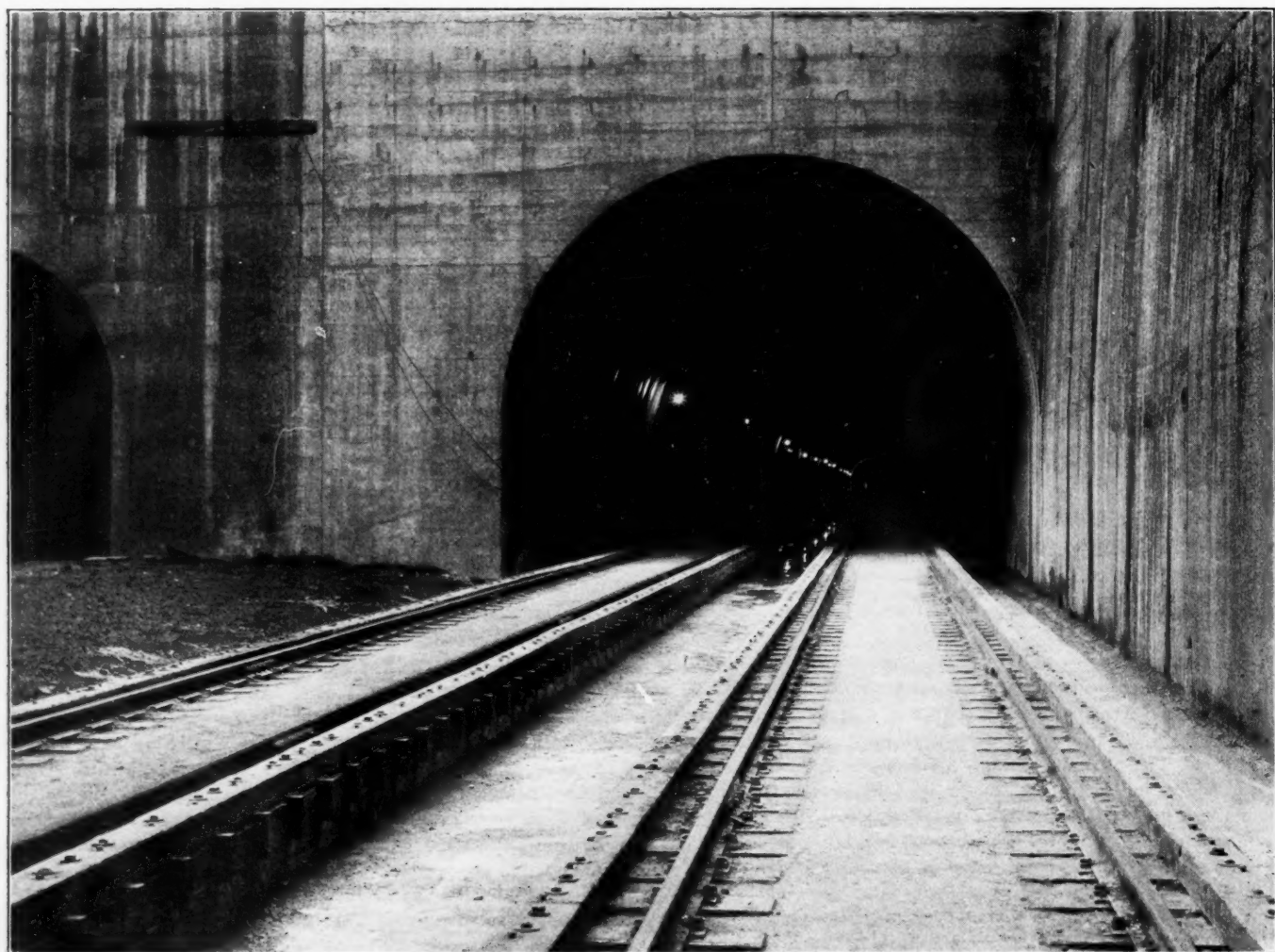
To replace the tie blocks, the lag screws fastening them to the guard rail are removed, the wedge withdrawn, the tie block moved forward (in the direction of the track) until the shoulder of the block clears the corresponding shoulder in the concrete; the tie block is then pulled out laterally without disturbing the adjacent tie blocks or rail fastenings and without raising the rail, thus avoiding any interference with traffic. An inch board could be put under the rail, resting on the concrete on either side of the tie block space, for temporary support.

Advantages of this construction are as follows: One man can readily replace the tie blocks and wedges, while with the ordinary type of ballasted track construction with long ties, it is necessary for a gang of men to dig out the ballast in order to replace a tie, and it is also necessary to protect traffic while the work is being done. In tunnels and subways where space is cramped, traffic is heavy and a track cannot be temporarily abandoned, and with the running rails, guard rails and third rails attached to the long ties, as is the case with electrified lines, it is extremely difficult and very expensive to maintain and tamp up track to surface and make tie renewals. With the tie blocks set in concrete, there will be no heaving of the track from frost in winter nor settlement of the track surface in the tunnel, as the lack of good drainage will not affect the track surface. So track maintenance requires only track inspection, instead of large maintenance gangs.

Tunnels and subways are ordinarily driven through rock or good earth, but even in places where poor materials are encountered the concrete construction with metal reinforcement will make a type of roadbed of ample stability. The tie blocks



Eastern Portals of New and Old Bergen Hill Tunnels.



Track Structure in New Tunnel.

View taken at one of the two open shafts in the interior of the tunnel. Old tunnel at the left.

are well imbedded in the concrete, which will prevent their bunching up in case of a derailment.

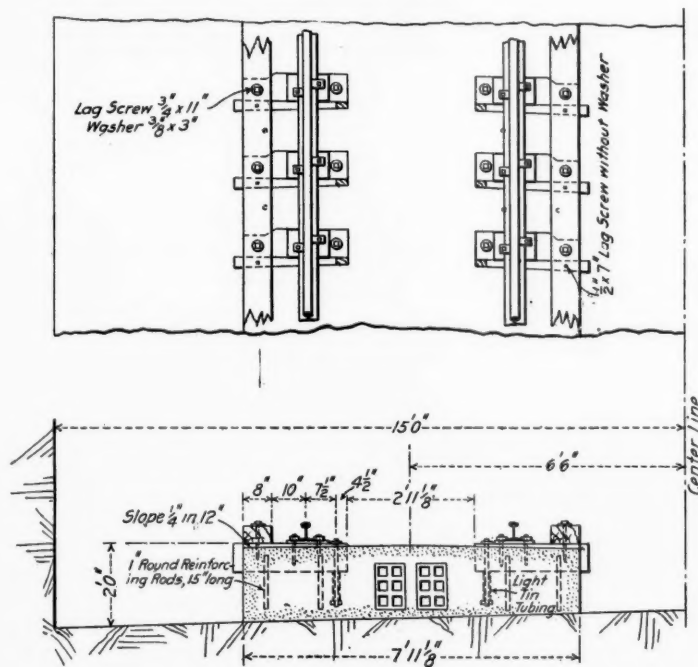
All timber materials are to be treated with 12 lbs. of creosote to the cubic foot. The tie blocks are long leaf yellow pine, roughed to 8 in. x 8 in. x 2 ft. 6 in., dressed to final shape and then creosoted. It is specified that the creosoted material should be properly piled and remain exposed to summer sun and air for about 3 or 4 months to permit the creosote vapors to escape. The wedges, which are of the same material, are similarly treated. In the Bergen Hill tunnel a plain wrought iron 6 x 12 x $\frac{5}{8}$ -in. tie-plate is used under the track rails, but for steam railway tunnels the revised design, with guard rails, provides for intermediate and joint tie-plates $7\frac{1}{2}$ x $11\frac{1}{16}$ x 12 in.; and for steam railway tunnels, without guard rails, and for subways and circular tunnel tubes, the intermediate tie-plates are 9 x $\frac{1}{2}$ x 10 in., and the joint tie-plates 10 x $\frac{1}{2}$ x 11 in., the longest dimension of the tie-plate being the one in the direction of the rail. Lag screws with large pitch of thread are used to fasten the wrought iron rail clips. Each tie-plate is punched with four holes and the clip fastenings staggered. If the timber block becomes defective at the lag screw holes or a lag screw is twisted off or rusts off, the clips can be

guard rail through the Bergen Hill tunnel, the object being to prevent any derailed trucks from slewing a car and side swiping a train passing on the adjacent track. Where lighter equipment is used, such as in subways, there is little likelihood of trouble from broken flanges causing derailment, and a guard rail is not considered necessary.

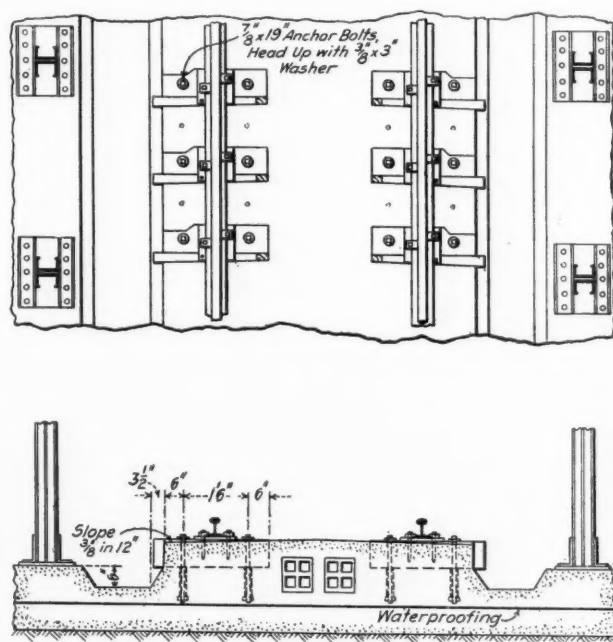
In the design without guard rail for subways and tunnel tubes, the tie-plate extends over the tie block and wedge, and the lag screw through it makes an efficient and practical attachment for holding the wedge in place and also utilizes the wedge area as additional bearing surface for the tie-plate. While the width of these tie-plates can be varied, yet it seems desirable to use a large tie-plate to make the mechanical life of the tie block equal to its physical life.

The trenches between the rails, in the tube and subway designs, afford an efficient means of cleaning and flushing out the tunnel and can be used to good advantage for temporary storage of track materials, such as tie blocks, etc. The construction of conduits for telegraph, telephone, or high-tension lines in the concrete roadbed reduces the volume of concrete and makes an efficient conduit construction.

If a third-rail construction is used the tie block can be ex-



Steam Railway Tunnel.



Subway Design; Openings at Sides.

readily reversed and lag screws used in the extra holes through the tie-plate. The tie-plates are sheared from universal milled bars, ordered in multiple lengths of the tie-plates, and the four holes in the plate punched at one operation. The rail clips are also sheared from universal milled bars, ordered in multiple lengths of the rail clip, and two passes of the bar through a planer before shearing shape the clip to fit the rail flange perfectly. Cast iron rail clips cannot be perfectly molded to fit the rail flange, and experience shows that the flange of the rail tends to wedge up and lift the clip and lag screw with an imperfect fitting rail clip. Iron is used for the tie-plates and rail clips to prevent, to a large degree, rusting. It has been found by experience in the maintenance of track in railway tunnels that engine gases and dampness cause rapid rusting of rails and rail fastenings, and the attachment of the running rails to fixed metal track supports that cannot be readily replaced is impracticable for this reason.

The accompanying drawings show suggested types of construction for circular tunnel tubes and subways, as well as the type used by the Lackawanna. The Lackawanna used a

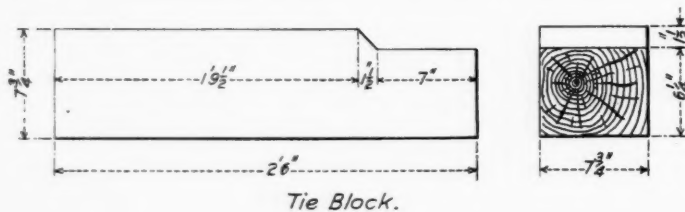
tended to support the third rail, or a bracket construction can be attached to the tie blocks for supporting it.

The Lackawanna tunnel roadbed was finished in the middle of January, 1909. It was not opened to traffic until a month later, however, in order to give the concrete some time to harden. The company originally had under consideration the construction of a ballasted roadbed, and the plans provided for two 12-tube conduits throughout the entire length of the tunnel, one conduit adjacent to each side wall, with the conduits encased in concrete and the top of the conduit construction to be of such height as would not interfere with clearance. The tunnel was constructed in trap rock throughout its entire length, and had the conduits been placed in the side-walls it would have been necessary to quarry out considerable rock to provide room for the conduits and give sufficient strength to the side walls.

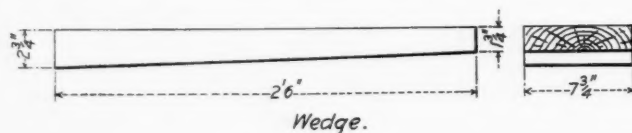
With the plans for ballasted track, the company provided for two lines of 8-in. tile drain throughout the length of the tunnel, one line on the outside of either track, and in this connection it provided for trenching out the rock so as to get a reasonably good depth for the tile drains below the ballast.

The new tunnel has been lined throughout its entire length with concrete, and down-drains are provided every 50 ft. in the side walls of the tunnel, as well as longitudinal drains about 5 ft. above the spring line of the arch for collecting water and diverting it to the down-drains. This tunnel runs close to the Jersey City reservoir, and there are a number of points where there is quite a large seepage of water. For this reason, in order to avoid difficulty with track maintenance, the original plans provided for the drains as noted.

The accompanying tables show an estimated cost of the ballasted roadbed construction for double track through Bergen Hill, in which are noted the details above described. So far as the amount of tunnel excavation and the cleaning up of muck under the roadbed are concerned, the cost would be the same whether ballasted track or concrete roadbed were used, but with the concrete roadbed the tile drains and trenching for ditches for the drains are eliminated. The estimated total cost, including the conduits, tile drains, creosoted ties, etc., as detailed, for the ballasted track, for a length of 4,280 ft., amounts to \$62,568.87, which would be at the rate of \$14.62 per lineal foot of double track. If the conduit construction is eliminated from consideration, the total cost amounts to \$43,429.87, or \$10.15 per lineal foot of double track. The detailed statement of actual cost of the concrete roadbed construction does not include any estimate for the concrete sub-base under the finished track superstructure. The statement in detail shows the actual cost for 4,280 lin. ft. of double track as taken from the company's invoices and records. This statement includes the two lines of 12-hole conduits. The railway company furnished sand, stone and cement for the concrete



Tie Block.



Wedge.

Tie Block and Wedge.

work, and the price of \$6.25 per cubic yard, given in the detailed statement for concrete roadbed, includes the contractor's price plus the cost of material. The contract provided that the contractor would lay the conduits, the railway company to furnish the material and the contractor to receive the same price per cubic yard for the work as he received for the balance of the concrete work, namely, \$3.50 per cubic yard. This price of \$3.50 per cubic yard included everything excepting sand, stone and cement. The company assembled the tie blocks and rail, and the cost of these items is included in the detailed statement. The cost figures \$14.26 per lineal foot of double track. Eliminating the conduit construction from consideration, the cost per foot of double track for concrete roadbed amounts to \$13.18 per lineal foot of double track as against \$10.15 per lineal foot of ballasted double track. Had the conduits been eliminated from the concrete roadbed construction, the superstructures could have been made about 4 in. less in height, which quantity would have practically made up for the area of concrete occupied by the conduits.

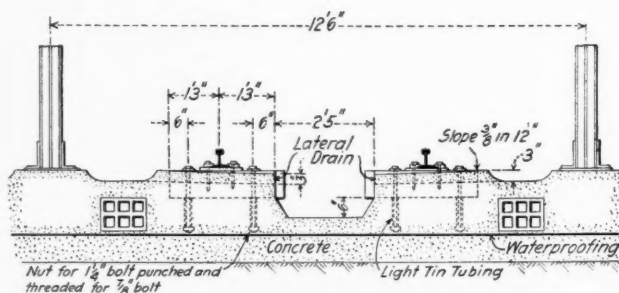
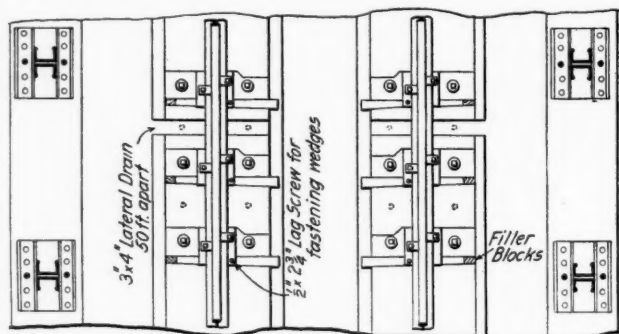
One inspector nights and one during the day will be all that is necessary for maintenance, for reasons already noted.

The following statement shows what it has actually cost the company per month to maintain ballasted track in the present

old Bergen Hill tunnel, which is the same length as the new tunnel:

	Per month.
Foremen	\$75.00
Laborers	400.00
Watchman	90.00
Total	\$565.00

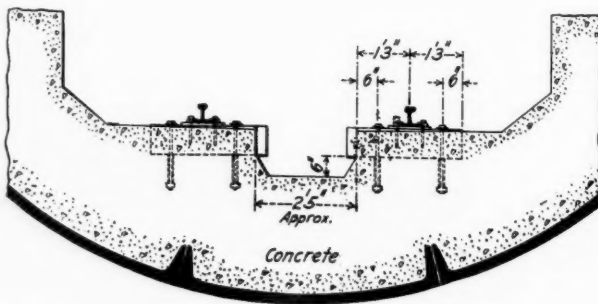
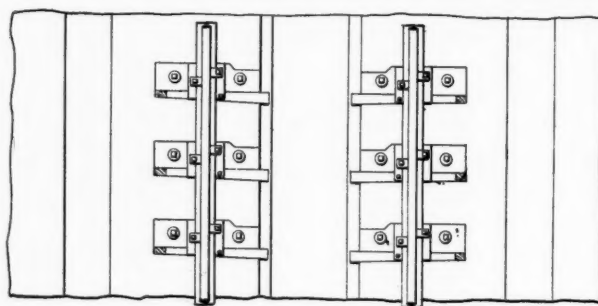
Capitalizing the investments for ballasted track construction and for concrete roadbed construction (including conduits) at



Design for Subways; Opening Between Rails.

4 per cent., and taking into consideration the difference in cost of maintaining, the saving per year in cost per mile of double track (with conduits) amounts to \$7,107.32. Without conduits the saving per year per mile of double track concrete roadbed would be \$6,389.42. What the comparative saving in renewals will be is a matter for future determination.

The proportions used in the track superstructure were one part of cement to six parts of Cow Bay gravel and sand; and in the sub-base the proportions were one part of cement to



Tube Track Construction.

twelve parts of crushed stone and sand for bringing the sub-base up to proper level.

Estimated cost of Ballasted Track Construction for Double-track Through New Bergen Hill Tunnel.

Length of tunnel, 4,280 ft.		
232 gross tons 91-lb. special open-hearth rail, at	\$34.00	\$7,888.00
520 pairs of angle bars	1.07	556.40
3,120 splice bolts	.03 1/4	104.00
3,120 nut locks	.009	28.08
8,835 tie-plates, 6 in. x 1/2-in. x 9 in.	.131	1,157.38
520 joint tie-plates, 6 in. x 1/2-in. x 11 in.	.171	88.92
18,710 spikes	.01 3/4	327.42
4,677 creosoted y. p. ties, 7 in. x 9 in. x 8 1/2 ft.	2.10	9,821.70
6,737 cu. yds. stone ballast, delivered	1.00	6,737.00
17,976 lin. ft. of vitrified 6-hole conduits, 5 per cent. allowed for breakage	.225	4,044.60
5,720 yds. drilling for wrapping conduit joints	.095	543.40
2,035 cu. yds. rock excavation for tile drains	7.00	14,245.00
8,988 lin. ft. of 8-in. drain tile; 5 per cent. added for breakage	.085	763.97
2,000 cu. yds. of extra concrete for conduits	6.25	12,500.00
8,560 lin. ft. single track laying and surfacing	.20	1,712.00
586 cu. yds. concrete voids, occupied by conduits, but charged for by contractor	3.50	2,051.00
		\$62,568.87

$\$62,568.87 \div 4,280 = \14.62 per ft. of double track.

If conduits are eliminated from consideration, the cost would be \$43,429.87.

$\$43,429.87 \div 4,280 = \10.15 per ft. of double track.

Actual Cost of Concrete Roadbed Construction, Including Electric Wire Conduits, for Double-track Through New Bergen Hill Tunnel.

232 gross tons 91-lb. special open-hearth rail, at	\$34.00	\$7,888.00
520 pairs of angle bars	1.07	556.40
3,120 splice bolts	.03 1/4	104.00
3,120 nut locks	.009	28.08
8,835 tie-plates, 6 in. x 1/2-in. x 9 in.	.131	1,157.38
520 joint tie-plates, 6 in. x 1/2-in. x 11 in.	.171	88.92
17,976 lin. ft. vitrified 6-hole conduit, 5 per cent. allowed for breakage	.225	4,044.60
5,720 yds. drilling for wrapping conduit joints	.095	543.40
9,360 creosoted y. p. tie blocks, 8 in. x 8 in. x 2 ft. 6 in.	45.00	5,616.00
9,360 creosoted y. p. wedges, 2 1/4 in. x 8 in. x 2 ft. 6 in.	45.00	1,579.50
17,680 intermediate rail clips	.039	689.52
18,720 pieces round iron 1 in. x 15 in. for reinforcement	.06 1/4	1,185.60
1,040 joint rail clips	.051	53.04
18,720 lag screws, 7/8-in. x 7 1/2 in.	.046	861.12
9,360 lag screws for guard rail, 3/4-in. x 11 in.	.034	318.24
9,360 washers for guard rail, 3/4-in. x 3 in.	.03	280.80
9,360 wedge lag screws, 1/2-in. x 7 in.	.013	121.68
18,555 lin. ft. of y. p. creosoted guard rail, 5 in. x 8 in.	45.00	2,783.25
4,680 guard rail anchor bolts, 7/8-in. x 18 in.	.08 3/4	405.60
4,680 guard rail washers, 3/8-in. x 3 in.	.03	140.40
4,680 anchor nuts, 2 1/4 in. sq. x 1 1/4 in. thick	.08	374.40
4,680 tin tubes for anchor bolts	.005	23.40
3,754.4 cu. yds. concrete	6.25	23,465.00
1,019.2 cu. yds. concrete voids, occupied by tie blocks, wedges and conduits, but charged for by contractor	3.50	3,567.20
Labor and engineering for assembling and fastening complete, tie blocks, wedges, guard rails, rail, rail joints, screws, screw-spikes, etc., 8,560 lin. ft.	.60	5,136.00
		\$61,011.53

$\$61,011.53 \div 4,280 = \14.26 per lin. ft. of double-track with conduits and wrapping.

Total cost, exclusive of conduits, is \$56,423.53.

$\$56,423.53 \div 4,280 = \13.18 per lin. ft. of double-track.

Comparative Annual Costs.

Cost per year, ballasted track, with conduits:	
\$62,568.87 at 4 per cent.	\$2,502.75
Track maintenance, \$565.00 per month x 12	6,780.00
Length of 4,280 ft.	\$9,282.75
$\$9,282.75 \times 5,280 \div 4,280 =$	$\$11,451.57$ per mile.
Cost per year, ballasted track, without conduits:	
\$43,429.87 at 4 per cent.	\$1,737.19
Track maintenance, \$565.00 per month x 12	6,780.00
Length of 4,280 ft.	\$8,517.19
$\$8,517.19 \times 5,280 \div 4,280 =$	$\$10,507.20$ per mile.
Cost per year, concrete roadbed, with conduits:	
\$61,011.53 at 4 per cent.	\$2,440.46
Track maintenance, \$90.00 per month x 12	1,080.00
Length of 4,280 ft.	\$3,520.46
$\$3,520.46 \times 5,280 \div 4,280 =$	$\$4,344.25$ per mile.
Cost per year, concrete roadbed, without conduits:	
\$56,423.53 at 4 per cent.	\$2,256.94
Track maintenance, \$90.00 per month x 12	1,080.00
Length of 4,280 ft.	\$3,336.94
$\$3,336.94 \times 5,280 \div 4,280 =$	$\$4,117.78$ per mile.
Annual saving, concrete roadbed as compared with ballasted track, each without conduits:	
Ballasted track, 4,280 ft., yearly cost	\$8,517.19
Concrete roadbed, 4,280 ft., yearly cost	3,336.94
Saving per year.	\$5,180.25
$\$5,180.25 \div 4,280 =$	$\$1.21$ saving per year per foot of double track.

TRAIN ACCIDENTS IN MARCH.¹

Following is a list of the most notable train accidents that occurred on the railways of the United States in the month of March, 1909. This record is intended to include usually only those accidents which result in fatal injury to a passenger or an employee or which are of special interest to operating officers. It is based on accounts published in local daily newspapers, except in the cases of accidents of such magnitude that it seems proper to write to the railway manager for details or for confirmation.

TRAIN ACCIDENTS IN THE UNITED STATES IN MARCH, 1909.

Collisions.

Date.	Road.	Place.	Kind of Accident.	Train.	No. persons reported— Killed. Inj'd.
13.	Seaboard A. L.	Colon, N. C.	bc.	P. & Ft.	1 5
15.	G. & S. A.	Sanderson.	xc.	P. & Ft.	2 15
15.	Louis. & Nash.	Cartersville, Ga.	bc	Ft. & Ft.	2 1

Derailments.

Date.	Road.	Place.	Cause of derlmt.	Kind of train.	No. persons reported— Killed. Inj'd.
10.	Ark. La. & G.	Monroe.	mal. ms.	Pass.	1 1
11.	C. B. & Q.	Peoria.	malice.	Pass.	0 0
12.	I. & G. N.	Tate's, Tex.	d. switch.	Ft.	1 0
24.	Union Pacific	Granger.	neg. eng'r.	Ft.	2 0
29.	Penn.	Gallitzin.	unx.	Ft.	0 0
*31.	Union Pacific	Castle Rock.	slide.	Pass.	2 0

Other Accidents.

1.	C. H. & D.	Findlay.	boiler.	Pass.	2 0
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The derailment at Gallitzin, Pa., on the twenty-ninth wrecked 10 freight cars. The report says that it was due to the breakage of an axle, a wheel or a rail. No person was injured, but the case is of interest as illustrating how a slight cause can make much trouble. The wrecked freight train was on track No. 1, but it blocked three tracks, Nos. 1, 2 and 3. An empty engine coming along a moment later on track No. 2 ran into the wreck and blocked track No. 4, on which passenger train No. 21 soon came along. This train had three engines, all of which were derailed; but its cars did not leave the track. No person was injured in any of the derailments.

The derailment on the thirty-first occurred in the Weber Canyon at 3.55 a.m. The train was running down grade so that the engineman was unable to check the speed at all after seeing the landslide. The mail car next the engine at once took fire from coals which had spread from the firebox, and the fire gradually spread until it consumed the first five cars of the train. The seven rear cars were pushed back by the passengers and thus saved from burning. The baggageman was burned to death in his car and the fireman was buried beneath the overturned engine. The bank at this point had never before caused trouble.

Of the electric car accidents reported in the newspapers in March, one, in Boston, resulted in the death of a motorman and the injury of 10 other persons, two of them fatally. A car delayed on a descending grade was run into by another, following, and eight cars, altogether, were involved in the smash.

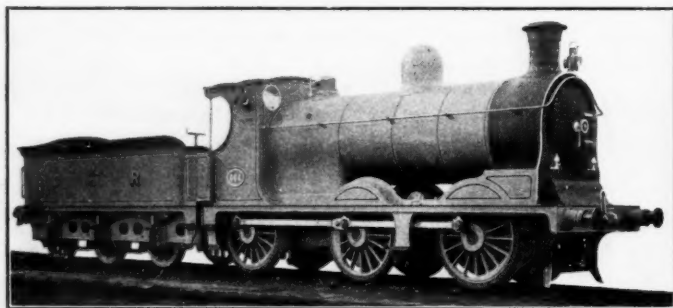
A society of locomotive engineers having established a school for the instruction in their calling for candidates for positions as enginemen and firemen, the Prussian Railway Minister has authorized the operating managements to assign to this and similar schools elsewhere rooms for their accommodation with fuel and light without charge, and to have the necessary furniture made in the shops and loaned to them.

¹ Abbreviations and marks used in Accident List:
rc, Rear collision—bc, Butting collision—xc, other collisions
—b, Broken—d, Defective—unf, Unforeseen obstruction—unx, unexplained—derail, Open derailing switch—ms, Misplaced switch
—acc. obst., Accidental obstruction—malice, Malicious obstruction of track, etc.—boiler, Explosion of boiler of locomotive on road—fire, Cars burned while running—P., or Pass., passenger train—F., or Ft., freight train (includes empty engines, work trains, etc.)—Asterisk, Wreck wholly or partly destroyed by fire—Dagger, One or more passengers killed.

GOODS LOCOMOTIVE WITH SPARK ARRESTER, CALEDONIAN RAILWAY.

A new series of goods engines of the 0-6-0 type is being built at the St. Rollox works of the Caledonian Railway. A special feature in the design is the novel form of spark arrester fitted. The accompanying illustrations, for which we are indebted to J. F. McIntosh, chief locomotive engineer, show the general appearance of the first engine of the series, and also the construction of the spark arresting device.

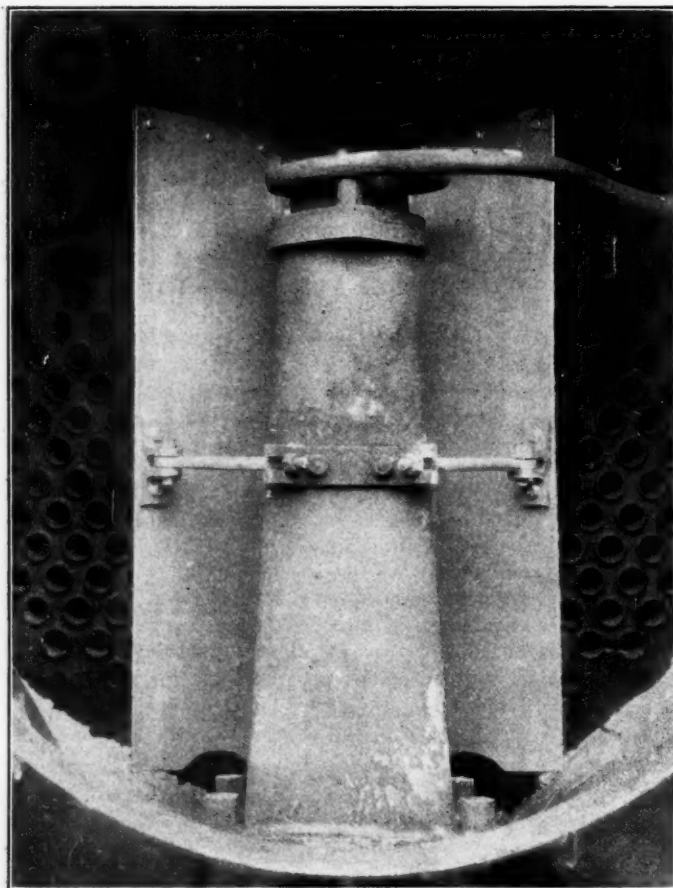
The inside cylinders drive the crank-axle of the middle pair



New 0-6-0 Goods Engine; Caledonian Railway.

of wheels, the slide-valves working between the cylinders and being actuated by Stephenson valve gear. The crank-axle is of the built-up pattern with journals $8\frac{1}{2}$ in. diameter by $7\frac{1}{2}$ in. long, and the connecting rod bearing is $8\frac{1}{2}$ in. diameter by 4 in. long. The leading and trailing axles have journals 8 in. diameter by $7\frac{1}{2}$ in. long.

The boiler is made of steel plates with 275 tubes of mild steel, galvanized, $1\frac{3}{4}$ in. external diameter. The firebox shell is 6 ft. 5 in. long by 4 ft. $0\frac{1}{2}$ in. wide at bottom, and the crown of the interior copper fire box is stayed with girder

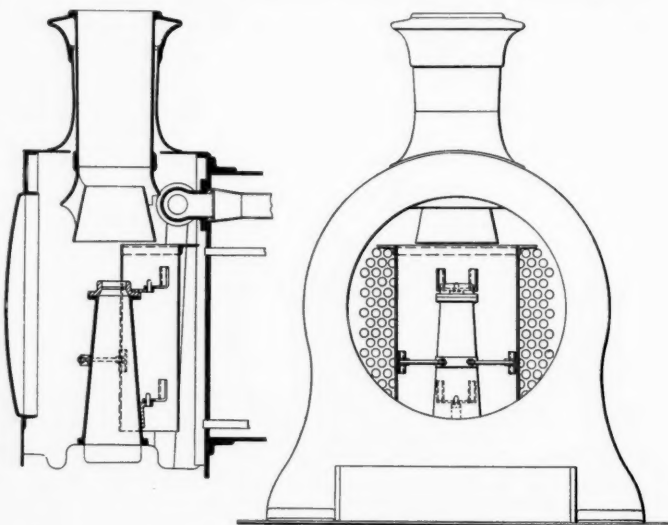


Spark Arrester on New Caledonian Engines.

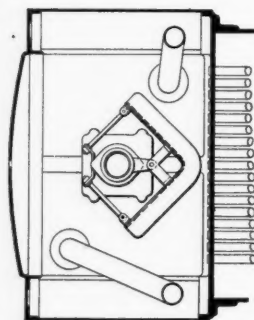
stays. The two Ramsbottom type safety valves mounted over the firebox are each 3-in. diameter, and adjusted for a working pressure of 160 lbs. per sq. in. The engine is equipped with a steam brake, and also has an ejector and "through" vacuum brake pipe, thus rendering it available for working express goods trains when required.

The spark arrester consists of two vertical planes meeting at an angle a few inches in front of the vertical centre line of the tube plate. In plan the section of the planes is a "V" with the apex next the tubes, and the blast pipe in the opening of the angle. The arrester extends from the bottom of the hood down to the level of the lowest row of tubes. To permit of the cleaning of the tubes it is pivoted on its supports on the blast pipe and so can be easily turned to either side alternately to give free access to the tubes. Two diagonal stays at the front lock it in the central position and it can be entirely removed from the smokebox by lifting it free of the pivots.

The main purpose of the device is to deflect live sparks away from the current of steam issuing from the blast pipe and to induce piling up of the cinders in the front portion of the smokebox away from the tube plate, so keeping the



Details of Spark Arrester on New Caledonian Engines.



lower rows of tubes clear. As the cinders are piled up at the front they gradually roll back, but as they are kept within the angle of the deflector plate they are largely kept clear of the tube plate. Experience has shown that the live cinders are broken up on striking the deflector plate and that whatever cinders are thrown out are black and consequently harmless.

The device is interesting as showing the possible differences in smokebox construction in England and the United States. The rather elaborate arrangements of the American locomotive contrast unfavorably with the simplicity of that shown here. Whether the same simplicity could be made to work with the difference in the coal used and the conditions of operation is doubtful.

In the following schedule of dimensions attention is called to the high ratios existing, especially that of the factor of adhesion and the ratio between grate area and heating surface.

The tender is carried upon six, 4-ft. diameter, wheels with a wheelbase of 13 ft. It weighs when full, with 3,000 gallons of water and $4\frac{1}{2}$ tons of coal, 37 tons 18 cwt., giving a total weight engine and tender in working order of 83 tons 12 cwt.

The spark arrester was designed by Mr. McIntosh and is the

result of extended study and experiment. In actual working it has been so satisfactory that arrangements have been made whereby it will in future be fitted to all new Caledonian locomotives.

The following are some of the principal dimensions of the engine:

Cylinders, diameter	18½ in.
Piston stroke	26 "
Wheels, diameter	60 "
Boiler, height of center above rail	7 ft. 9 "
" length of barrel	10 " 3½ "
" diameter of shell	4 " 8½ "
Heating surface, tubes	1,284 sq. ft.
" " firebox	119 "
" " total	1,403 "
Grate area	20.63 "
Steam pressure	160 lbs.
Maximum tractive force	17,800 "
Wheel base	16 ft. 9 in.
Weight in working order	102,368 lbs.

Weight on drivers	=	5.70
Tractive effort		
Tractive effort x diameter drivers	=	831.77
Heating surface		
Heating surface	=	62.23
Grate area		
Firebox heating surface	=	9.27*
Total heating surface		
Weight on drivers	=	79.72
Total heating surface		
Displacement of 2 cylinders, cu. ft.	=	7.19
Total heating surface	=	178.58
Displacement of both cylinders		
Grate area	=	2.87
Displacement of both cylinders		

*Per cent.

NEW RAILWAY LAWS IN TEXAS.

Nine laws were enacted at the recent regular session of the Texas legislature and all but one of them have been approved by Governor Campbell. The particular one which met with the governor's disfavor was that authorizing the consolidation of the Wichita Falls lines. There are three of these roads, all owned by the same interests. The railway measures approved by the governor were as follows:

An amendment to the act defining the liability of common carriers for injuries to employees. The amendment provides that damage may be collected though the injury may be due in part to contributory negligence on the part of the employee injured or killed. The jury is to modify the amount of damages according to the degree of contributory negligence as compared with the company's responsibility.

After January 1, 1910, every locomotive must be equipped with an ash pan which can be emptied or cleaned without the necessity of any employee going beneath the locomotive.

The anti-pass law was amended, exempting from its operation members of volunteer fire departments, employees of express companies and employees of railways and immediate dependent members of their families.

No person shall be employed as locomotive engineer without having first served three years as a fireman; and the law prohibits the employment of any person as a conductor who has not first served two years as a brakeman.

Railway companies are forbidden to designate a station by any name other than that given by the United States Postoffice Department.

Railways in Texas must do all the repairing of their cars and other equipment in state. The new law prohibits any railway from sending its cars and locomotives out of Texas for

repairs. This act will have the effect of causing the Texas roads to enlarge their shop facilities, it is supposed.

An act was passed to regulate the presentation and collection of claims for personal services, or for labor rendered, or for material furnished, or for overcharges in freight or express, or for stock killed or injured by any railway in the state, the fixing the attorney's fees to be recovered in cases where the amount of such claim does not exceed \$200.

All trains must be run with a full crew, and a full crew on a passenger train shall consist of one engineer, one fireman, one conductor and one brakeman; on a freight, gravel or construction train, one engineer, one fireman, one conductor and two brakemen. A light engine shall carry a crew of one engineer, one fireman and one brakeman.

REPORT OF THE BOSTON METROPOLITAN IMPROVEMENTS COMMISSION.

Pursuant to an act of the Massachusetts legislature a commission of five members was appointed in 1907 to investigate and report on the advisability of any public works in the Metropolitan District (Boston), which, in its opinion, will tend to the convenience of the people, the development of local business, the beautifying of the district, or the improvement of the same as a place of residence . . . the control or direction of traffic or transportation, and the location of such docks and terminals as the district may demand. . . .

The report of the commission was submitted to the governor and to the mayor of Boston, March 15, and incorporated therein the report of George R. Wadsworth, Engineer for the Commission, recommending a proposed ultimate development of the present steam railway systems of the Boston terminal district.

Boston is served by four steam railway systems, comprising eight main lines and one short narrow gage line. Passenger traffic from the four divisions of the Boston & Maine from points in eastern and northern New England terminates at the North Union station, near the northerly limits of the city proper. Passenger traffic from the Boston & Albany, from the West, and from three divisions of the New York, New Haven & Hartford, from points in southern and western New England, terminates at the South Union station, about one and one-half miles from the North station. In addition to these three systems the Boston, Revere Beach & Lynn, a short narrow gage line, from Lynn, terminates in East Boston, across the harbor from the city proper, with ferry service to Boston.

The narrow gage road performs no freight service. Serving the three principal systems are twelve local delivery yards, each having a more or less rigid relation to one or another of the eight entering main lines.

The engineer's report comprises about 45,000 words and includes several tables of statistics, diagrams and drawings illustrative of the text, two of which are reproduced herewith.

In opening, Mr. Wadsworth says: The aim of managements of manufacturing enterprises throughout the world is to effect the greatest economies in the cost of production, consistent with the standard of quality and price in the manufactured product demanded by the consumer.

One of the most obvious steps in line with this aim is effective consolidation, which in the last 25 years has been most apparent among those particular interests which manufacture transportation, the railway companies.

Comparatively few years ago each of the eight trunk lines entering Boston represented a separate management and maintained its own terminal station for freight and passenger traffic. At the present time consolidation has progressed up to the point where there are four separate managements and three passenger terminals in Boston.

Any specific recognition of the present identities of the several steam railway managements and properties as deter-

mining factors, is believed to be wholly incompatible with logical suggestions for an ultimate and homogeneous development of the transportation lines within the terminal district.

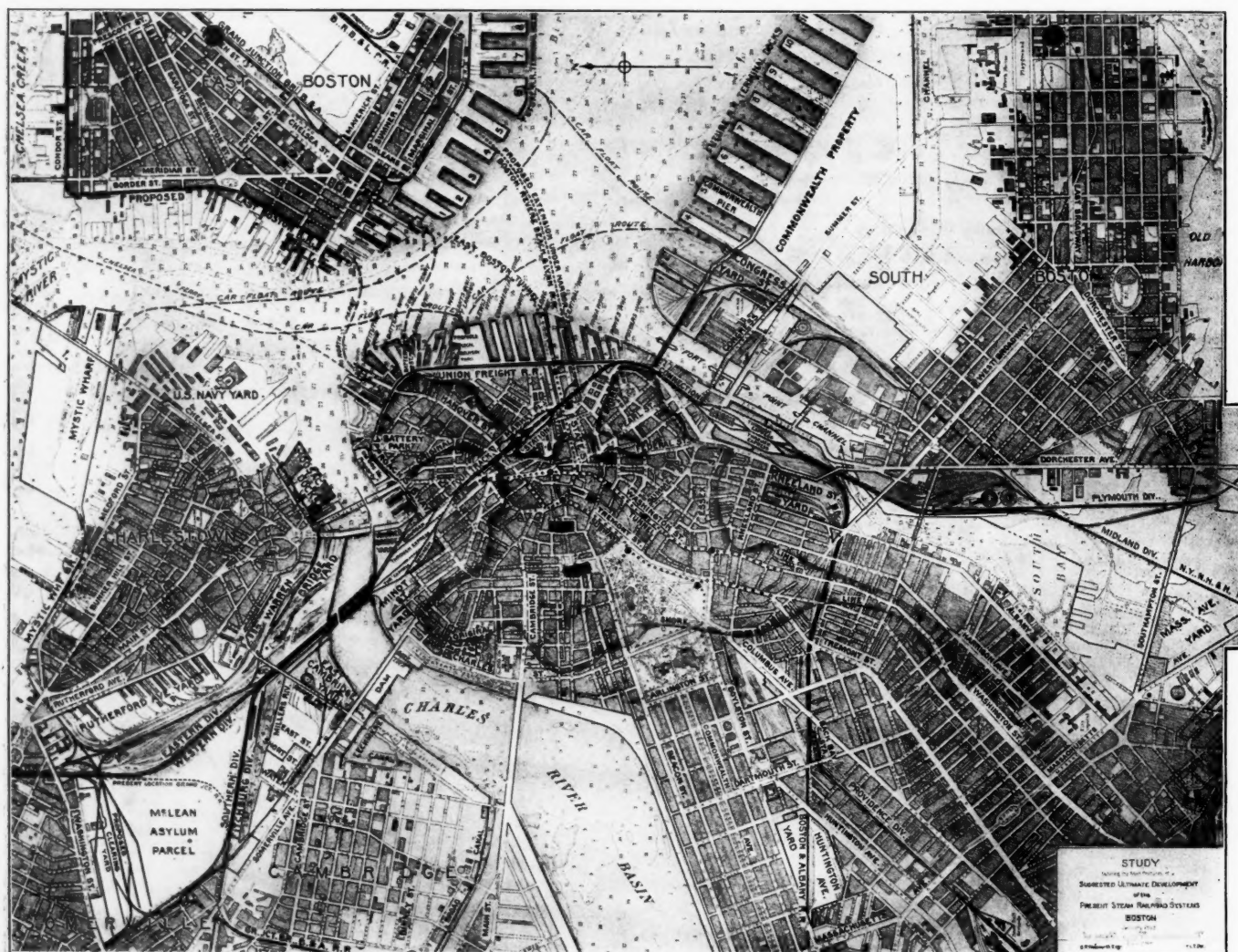
That a due recognition of these corporate divisions, both physical and operating, must be made at the outset is obvious; but any system which will ultimately represent the highest type of public service, consistent with economy in operation and maintenance, must be developed along the broadest lines throughout the entire horizon.

Such a development is not possible under a system requiring more or less strict adherence to the interests of the several railway corporations involved. No definite recommendations would be warranted without having at hand comparative estimates based on designs embodying more or less detail. No detail designs or estimates have been prepared, and the entire

road, located along the Atlantic avenue water-front of Boston proper between the North and South stations.

The suggested development of the terminal distributing system for local freight or tonnage for transshipment at piers or wharves would render possible the introduction of a "District System" of local delivery. That is, within certain limitations patrons would receive and deliver freight at the local station nearest their place of business, irrespective of the routing of the consignment.

Under prevailing conditions in Boston, and in fact in most other communities, patrons must receive and deliver freight at the local yard of the trunk line enjoying the haul, and in many instances this necessity entails a team haul of the goods entirely across the city. The adoption of the system of local delivery proposed would obviously eliminate a vast amount of



Suggested Ultimate Development of Boston Communications.

investigation has necessarily been in the nature of a preliminary study.

Particular stress is laid upon the necessity of eliminating the existing rigid features of operation which are due to the present condition of the various terminal properties consequent to development along independent and competing lines. In accordance with the development recommended all local yards for the receipt and delivery of freight as well as all piers and wharves within the terminal district, with few limitations have direct rail connections with all entering trunk lines. Extensions and revisions to existing properties are recommended to accomplish this result, among them the installation of a clearing yard and changes to increase the effective capacity of present connecting lines, the Grand Junction branch of the Boston & Albany, and the Union Freight Rail-

teaming through city thoroughfares. In this particular Mr. Wadsworth says: Revisions to the railway properties to facilitate the placing of cars, by rail, at the station nearest the place of business of the consignee, would not only effect an annual saving in teaming of about 6,000,000 ton miles, but would relieve the city thoroughfares of a considerable proportion of the team traffic, and at the particular points where today its intensity is the greatest. That is, by dividing the city into zones and districts, each district to be served as far as possible by its prescribed local freight station, the boundaries of the districts would quite properly lie along the thoroughfares in the now business center of the city.

The district system of delivery practically eliminates competition within the terminal district. We quote as follows: It is obvious from the scope of the development suggested

that as regards freight tonnage, actual competition among the present steam lines is practically eliminated within the terminal district and relegated to trunk line haul. The proposed district system of local freight delivery to a great extent retires the various points of strategic advantages in the matter of terminal deliveries at present respectively characteristic of the several railway systems, in favor of the broader policy of extending every advantage to all terminal patrons, irrespective of location.

For purposes of detour, as regards traffic from localities within 15 miles of Boston destined to points in northern and southern New England, certain revisions and extensions to existing terminal features in Boston will provide for the expeditious and economical transfer of through freight. To provide flexibility in the interchange of traffic among and between the entering trunk lines, the local freight stations and

adapted to this use, sites near a good labor market, where the housing of operatives is in well-established and neighboring localities. The mere fact that belt line routes are being operated successfully at other cities throughout the country is in itself no criterion as applied to Boston.

The conclusions regarding the development of the passenger system are prefaced by a division of traffic into its components. The following classes of service within the terminal district are believed to be distinct:

A. Through express traffic.

B. Suburban traffic. (Comprising local service of the present steam lines, serving largely to carry the business and shopping population from suburban home stations, on express schedule, direct without change, to a city station within five minutes' walk of actual destination, office, store or theatre.)

C. "Rapid transit" service. (Comprising urban and suburban service, as performed by the elevated and subway divisions of the Boston Elevated Railway, a distinctly "local" service with multiple unit trains, frequent stations and but limited express service.)

D. Street car service. (Whether performed on the surface or in the subways.)

Under this classification the two kinds of service performed by the suburban and rapid transit systems of transportation are entirely distinct. The former implies express service from suburban stations ultimately 30 miles or more from the city proper direct into a special distributing system in the city, where passengers may leave trains at one of several stations. Rapid transit service, as the properties are built and operated at present, implies a convenient service from the near suburbs into the city proper with frequent stations, trains making all stops, and no express tracks or service.

The permanent way clearances of the present elevated and subway structures are not sufficient to accommodate standard multiple unit equipment of the modern type for suburban service, a car approximately 10 ft. wide by 60 ft. long. Equipment of this type cannot be operated over the present rapid transit properties.

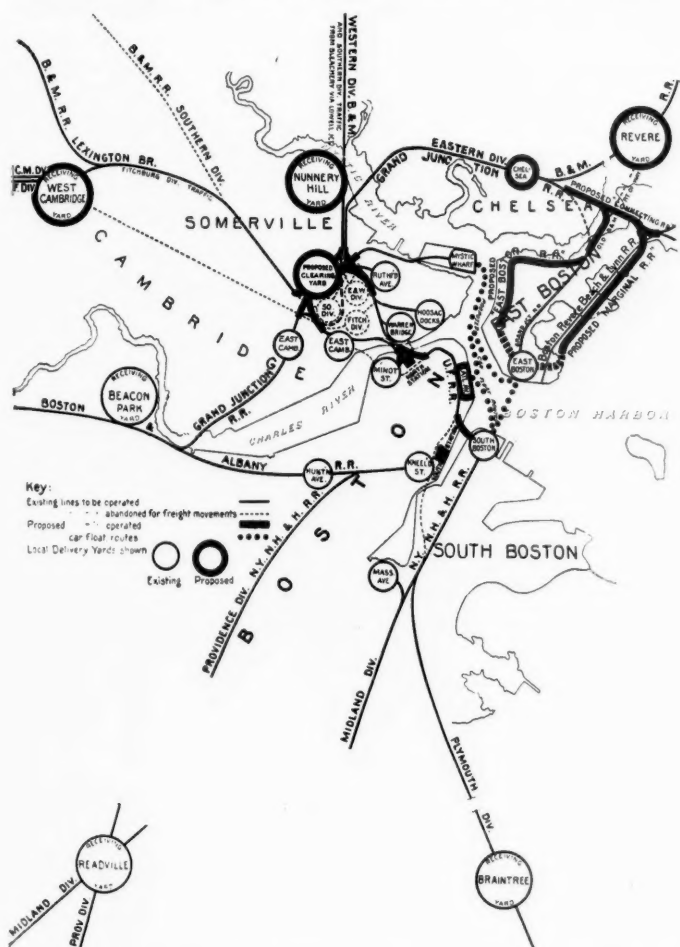
The type of the present "L" and subway car, with side seats, center exit and end entrance, is perhaps the best general type for the service required; that is, for a system where the running time between terminals is limited, not so much by the speed between stations as by the rapidity of loading and unloading passengers at the frequent stations.

On the other hand, this type of equipment, which sacrifices the comfortable cross seats to the demands for the rapid handling of passengers at the stations, is not conducive to the comfort of patrons for a 30-mile run from the suburbs, where the schedule is limited rather by the actual speed of the train between stations, than by the time consumed in loading and unloading at the comparatively infrequent stops.

Although at its inception the elevated and subway system might have been laid out and designed for the ultimate joint use of suburban and rapid transit traffic, the transition is considered impracticable and inadvisable to-day. Future subways or "L" structures should be designed as extensions to the present system, which should remain distinct to perform its important and characteristic service in the general system of distribution within the terminal district.

Any development which maintains the terminal features of the present system involves the transfer of all passengers at the terminal stations to some secondary distributing system. If a primary distributing system can be installed and operated a greater number of passengers can be landed within easy walking distance of destination without transferring to surface, subway or elevated lines.

Any new stations within the business center of the city which will serve all suburban trains will be of great benefit to a certain portion of the public who daily enter the city and likewise reduce the number of passengers to be handled at the present stations.



Proposed Changes to Effect Flexibility in the System of Local Freight Distribution.

the water front, revisions and extensions to existing terminal features will likewise bring about this result and perform the function at a great saving in mileage over a belt line. For the purpose of stimulating industrial activity, by offering advantageous sites for manufacturing purposes, a belt line traversing territory within a radius of 20 miles of Boston would offer no inducements. Thirty-five years ago it is probable that a belt line proposition might have been prosecuted on a sound financial basis. To-day there is no valid reason for its construction even were the same subject to sound finance. The same results as to flexibility in traffic movements which a belt line would provide can be accomplished more advantageously, and at indefinitely less cost, in another and more direct manner. The sites of future industries, which shall represent the greatest efficiency in production must as a rule be on the water front at the foci of the arteries of transportation. There are millions of square feet of flats both at East and South Boston admirably

The main features of the present system of operation at the passenger terminals is outlined as follows:

The operation is strictly terminal, there being no through or loop movements at the terminal stations. Operation on this terminal basis obviously entails reverse movements for all except spot trains from the train shed to the terminal storage yard for passenger equipment. The so-called spot trains, always for local or suburban service, are not turned, nor do they leave the trainshed, except on outbound schedule. The locomotive inbound cuts off in the trainshed and a second locomotive is put into service for the next outbound run of the train.

Most of these reverse movements of inbound trains after discharging passengers from the train shed to the terminal yard, where locomotives and cars are turned, cleaned, restocked and again made up in the proper order for outbound service, must cross inbound traffic at the entrance to trainshed yard. This is also true in movements of trains for outbound service, made up in the terminal yard and backed into the train shed for the loading of passengers and baggage prior to regular schedule movement outbound.

Provision must always be made at the entrance to any yard serving two or more divisions or systems, by an adequate system of signal and interlocking, for the crossing of numerous movements of regular traffic. This class of cross traffic movement can only be avoided by the installation of a more or less complex system of track grade separations at the entrance to the yard.

The observance of a proper system of signals renders this operation for regular traffic reasonably safe and expeditious, but as the traffic requirements increase the idle movements and crossings incident to terminal operation multiply rapidly, thus increasing the possibilities of accident or congestion and consequent delay.

These reverse movements of trains that have completed their run, as well as movements into the train-shed of empty trains prior to loading, in fact all movements incident to a regular day's business, are to the despatcher as much a part of the regular operating schedule as the movement of trains listed for public service in the time-table. Up to a certain limit, so long as this schedule is strictly maintained, there is no congestion, no matter how intense the traffic may be.

As traffic requirements increase additional trains become necessary, and during rush hours platform service tracks must be cleared more quickly. Ordinarily every additional train entails three crossings of traffic at the neck of the trainshed yard. The intensity of traffic at this point increases, and with it the possibility of congestion. Upon the slightest upset to the schedule, the stability of the system is shaken, and results detrimental to regular and dependable public service become very far-reaching.

Based on the present rate of increase of passenger traffic the railway managements will soon be confronted with the economic necessity of providing, both at the North and South stations, increased facilities, not merely to accommodate with safety and regularity traffic immediately in hand, but in anticipation of the requirements of service for many years' growth, at a like or greater rate.

The system devised should provide for the greatest flexibility in operation, a characteristic which is virtually insurance against indeterminate operating or traffic requirements which may arise in the future.

After considering various possibilities towards increasing the effective capacity of the present terminals, a subsurface connection between the North and South stations is recommended. Such a connection eliminates the necessity of strict terminal operation, and renders possible certain economies of operation which cannot otherwise be affected. We quote as follows:

It should again be noted that all suggestions for construc-

tion and operation are contingent upon the complete electrification of all lines entering the city, at least within the terminal district.

The need of through schedule, long distance trains, from northern to southern New England points through Boston, and *vice versa*, is practically negligible so far as affording any argument for building a connection between the two stations.

With a connection between the two stations, and all platform tracks in each train room leading into the connecting tracks, every train movement would become a forward or through movement, provided the location of the present terminal yards for the storage, cleaning and turning of terminal equipment were transposed. That is, trains from the Boston & Maine system would proceed through the city and the South station into terminal yards on the New Haven property adjacent to South bay. On the other hand, trains from the Boston & Albany and the New Haven systems would proceed to a terminal yard on Boston & Maine property north of the Charles river.

This feature is a fundamental requirement of the system it is proposed to develop.* * *

This recommendation toward the ultimate transposition of the present yards for the storage of passenger equipment is in no sense a radical suggestion, as it is eminently in line with the requirements for facility and economy in operation and the rebuilt yards for electrified equipment would be the same whatever the identity of the equipment served.

In addition to the economies which would be effected by the operation and maintenance of two terminal yards for passenger equipment as proposed, instead of the seven yards which maintain under existing conditions, the present switching movement between the terminal station and the terminal yards would be practically eliminated.

Under the present system of operation the road engines of many inbound trains cut off in the train shed, and after unloading, the trains are pulled to the terminal yards by switch engines. In fact a large number of engines are now maintained and operated for this distinct class of service, for movements between the train shed and the terminal yards.

Under the system proposed, providing for through movements, the road engine (electric locomotive or multiple unit train) inbound, would continue with its train to the terminal yards and outbound would pull the train from the terminal yard, no switch engine service being required. As \$12,000 per year is a fair average cost for maintaining and operating a single switch engine, the saving thus effected rapidly capitalizes permanent improvements to eliminate switch-engine service.

Depressed train rooms, with separate groups of tracks for through express and for suburban service, are provided at both stations, all platform tracks leading to the connection between the stations. In each case the passenger concourse is maintained essentially at street grade, the track grade of the train room being about 23 feet below. An additional station, for suburban traffic only, is recommended in connection with the proposed subway, about midway between the present terminal stations.

The narrow gage Boston, Revere Beach & Lynn Railroad, now terminating in East Boston is standardized, extended under the harbor by a tunnel and entered into the connection proposed between the two stations.

So far as operating limitations are concerned, the plan recommended places Boston at the intersection of several through lines of transportation. Passenger traffic from all lines enters one distributing system, which may be extended in the future as conditions may warrant. The physical properties present no obstacles to the operation of trains from any line through the distributing system to any other line or return. In short the operation may conform strictly to the requirements of traffic as such requirements may develop.

RAILWAY CAPITAL AND VALUES.*

BY W. H. WILLIAMS.

Third Vice-President, Delaware & Hudson Company.

(Concluded from page 846.)

Both the public and the common carriers are more or less familiar with those sections of the Act to Regulate Commerce which require the Commission to investigate any and all complaints regarding violations of the Act; and which authorize the Commission to institute inquiries on its own motion; to fix reasonable maximum rates, to establish through routes and joint rates, and determine the division of rates; to award damages; to regulate the allowance to shippers for service; and to prescribe the rules and regulations governing the issue of tariffs, etc.

It is doubtful, however, if other than the accounting officers of the carriers are familiar with the provisions of Section 20, and in view of the relative importance of that section to the subject under discussion, it seems desirable that the same be quoted in full.

That you may understand the manner in which the Commission is working under Section 20, I desire to quote the following extracts from Professor Adams' address of October 11, 1907, before the Government Accounting Officers at Washington:

"The government has recently undertaken to do something quite different from that which it has ever undertaken to do before. It has undertaken to exercise a controlling influence upon the administration of railway properties through the agency of their accounts.

"I assume, further, that you will not take it amiss if I place some emphasis upon the political aspect of this new step which the government has seen fit to take, political, not in its party sense, but in the broad sense of political science. What do these orders of the Commission relative to accounts mean for our government? What do they mean as a form of control of aggregations of capital which, under present conditions, are a menace to the stability of this nation? And I further call attention, in passing, to the fact that the success of what the Interstate Commerce Commission is undertaking in this regard, aiming, as I have remarked, at the control of railway accounts, will serve as a model, if it succeeds, for the control of all forms or agencies of consolidated capital which endanger the perpetuation of the principles upon which our government rests.

"Now, there is one thing in which this government is woefully deficient, and that is in the development of any governmental administrative agencies, so far as industrial affairs are concerned. The marked difference between the German constitution and the American constitution is that we overestimate the exercise of judicial functions and underestimate the exercise of administrative or supervisory functions, whereas in Germany the reverse is true. They have a perfect administrative supervision, although the expressions at least of the rights of the individual are less definite and direct than in this country. It is with no intent to disparage the importance of judicial administration, or of that method of procedure which aims to redress wrongs by passing judgment upon complaints, but if my view of this situation is correct, the other method of making effective governmental control over industrial affairs contains the greater hope, and the significance of the twentieth section of the act to regulate commerce is that it provides a practical means within a limited area of working out the theory of administrative supervision.

"Call to mind that the aim of the supervision of accounting is to exercise influence upon the administration and management of railway property; call to mind, further, that the function of accounts is to record facts, and that true accounting is nothing more, nor nothing less, than the correct statement of what, in fact, has taken place, and the measurement of that fact in an appropriate figure. Now, control over the manner in which those facts are recorded, and the assignment of some degree of personal responsibility upon some specially designated official, must result in a very direct influence upon the administration of railway properties.

"The method by which it is hoped that this will be accomplished is found in the order promulgating these accounts.

"The order holds the accounting officer of each railway responsible for the proper application of the rules laid down, which, in effect and to the extent that the law has jurisdiction over this matter, makes every accountant in this country the agent of the United States government for the execution of the law.

"Now, you may say this is setting up a partnership, as it were, with the carriers. That is true. If you go back to the fifteenth century and ask what is a corporation, a very significant answer is made. At the time the corporation originated, as an entity in English law, the corporation was regarded as an arm of the state. There was some func-

tion which the state desired to perform, or to have done; which the state, for some reason, did not desire to perform directly and immediately. It, therefore, selected certain men and said: We will incorporate you, give to you the liberty of doing this thing, and you will be responsible for the doing of it. The East India Company is an illustration of a corporation of this kind, the corporations that established the state of Pennsylvania and all of our plantations are illustrations of corporations of this kind. Everywhere the corporation was conceived to be a part of the government, and within the limits that the government chose to exercise its supervision, the corporate official was responsible to the government.

"Now, in the industrial development that has characterized the life of the English-speaking people the modern corporation seems to be more or less of a purely private affair. Our industrial philosophy led to the complete separation of state and industry. As a result of this policy, while great benefits have accrued, certain evils also have shown themselves, and the time has come when it is necessary to select certain of these corporations, at least, and restate for them the old and original theory of the corporation. I do not know that this explanation was present in the minds of Congress when it passed the twentieth section of the act to regulate commerce. I do not know whether what I have said was consciously recognized by the members of the Interstate Commerce Commission when they framed the order under which the operating accounts were promulgated; but this I do know, that through the agency of accounts and by means of that order which imposes upon certain officials of the railroads the personal responsibility of executing the Commission's orders relative to accounts, a long step has been taken toward the realization of the sixteenth century theory, and to my mind the correct theory, of corporations. Such, then, very concisely stated, is the political aspect of this government supervision over railway accounting which marks the most recent phase of railway legislation."

In connection with this address by Professor Adams, your attention is called to the following clause in the Report of the Interstate Commerce Commission for the year 1907:

"If Congress designed by the provision which it made for a prescribed system of accounts that the Commission should do what lies in its power to guarantee the sound financing of railways, the making of an inventory appraisal of railway property cannot longer be delayed."

There is nothing in the Act to Regulate Commerce which justifies anyone in supposing that Congress expects the Commission to "guarantee the sound financing of railways." Section 20, however, provides a means by which the Commission and the public can be kept fully informed regarding the operation and policy of each company. Their present operations are conducted under contracts with the states; such contracts being commonly known as charters. Neither party can ignore the provisions thereof without the due consent of the other. Two attempts to have Congress pass a bill providing for a physical valuation of the railways have failed of passage by Congress. It has been stated, however, that the Commission may find it possible to undertake such an investigation under the provisions of the Emergency Currency Act. If this be their position, they are seeking to accomplish by indirect means something to the securing of which by direct means Congress has withheld its approval.

What Professor Adams (and possibly the Commission) has in mind is not a question of regulation, but a question of control over the operations not only of the common carriers, but of all manufacturing and commercial establishments whose business is not confined exclusively to one state. He seeks to secure this control by a physical valuation, and a system of accounting.

The present plan contemplates requiring the carriers to add to their cost of property any and all amounts which, in the past, have been expended for Construction or Additions and Betterments and charged to Operating Expenses, Income Account, or to Profit and Loss Surplus, thus changing the General Ledger accounts as they exist to-day.

In the event of a physical valuation of the properties the companies will be required to ignore the facts as set forth on the present books of the companies, and open up a new set of books, using as a basis the figures obtained by means of a physical valuation.

The present plan does not contemplate any valuation appearing on the books for franchises, good will, etc., notwithstanding the fact that property is of no value without the right to use it. To carry this theory to a logical conclusion, the book accounts should be ignored from time to time, as the

*An address before the New York Traffic Club.

physical value of the plant changes with the commercial conditions; whether this be due to changes or fluctuations in the price of material entering into the construction changes in land values, or other causes. No plan has yet been suggested as to the manner in which they purpose making an adjustment between the proposed accounts and the securities outstanding.

Can we afford to place in the hands of a Commission, composed of a few men, the power to write up and down, at will, the value of the carriers' property, especially when we bear in mind that the membership of the Commission is constantly changing; that different men have different views regarding valuation; and that we already have the experience of the Michigan Central, where such a Commission, by a slight change in the interest rate, made a difference of \$20,000,000 in the value of the property of that company within two years? Shall either the rates or the capitalization of the companies be dependent on so unstable a basis?

The suggestions of the Commission regarding other matters affecting the capital accounts of the companies are equally objectionable and unfair to the railways. For example:

First.—They have established depreciation accounts without setting up appreciation accounts; notwithstanding the repeated rulings of the courts that depreciation and appreciation must be treated alike.

The depreciation accounts as promulgated also interfere with the ability of the operating officer to analyze his expenses, inasmuch as they require the roads to include in their operating expenses amounts other than those actually expended, making it especially difficult for those not familiar with accounting systems to distinguish as between theoretical and actual expenses.

Second.—They overlook the right of the railways (and common to all corporations) to capitalize discounts on securities sold.

Discounts on securities sold represent the increased commercial risk of the investor as compared with other investments in commercial pursuits, and the right to capitalize the same has been passed on favorably by the courts.

Third.—Contrary to almost uniform practice of the railways, they contemplate the charging to Operating Expenses of from 50 to 70 per cent. of the cost of reduction of grades, changes of line, revision of yards, etc. They ignore the fact that the net returns of a property can be increased as much by the reduction of expenses as by an increase in revenues. A penny saved is a penny earned; but usually to earn an additional penny a railway has to spend six-tenths of a cent for operation. A reduction of \$1,000 in expenses is equivalent to an increase of \$2,500 in gross revenue. In either case the net earnings of the company are increased just \$1,000.

If the Commission maintains its plan, and it be sustained, then the investment of new capital for reduction of expenses will be discontinued, and it will only be employed for purposes that will increase the gross revenue.

The public are equally interested with the railways in this question of capitalization. Interference with their ability to secure the necessary capital with which to continue the development of existing lines and construction of new ones must correspondingly adversely affect their ability to properly serve the public. The present tendency is to restrict the ability of the roads to raise new capital, while at the same time increasing the expenditures for non-revenue producing property through legislation requiring the elevation of tracks, erection of new interlockings, block signals, new stations, and increased passenger train and other service that is unremunerative.

The action of the Interstate Commerce Commission on the subject of depreciation affected the net earnings applicable to fixed charges, dividends, new construction, etc., to the extent that such charges exceeded the actual expenditures during the year. For example, one road showing for 1906 a surplus of \$1,400,000, charged for depreciation in 1907 \$1,200,000, and the

surplus for the year 1907 was approximately \$200,000. The actual net returns of the two years were practically identical, the difference being caused by the substitution, under the instructions of the Interstate Commerce Commission, of "theoretical bookkeeping" for a record of the facts.

The public, not understanding the cause of the great difference in the performance of the railways, as indicated in reports to the Commission, became alarmed regarding their investments, and this assisted in hastening the panic of 1907.

In an address delivered in 1907, L. F. Loree stated:

"In the past the energy, courage and skill of the railway officers have been devoted to new construction, to the bettering of the line and grade of the old roads, to a great improvement in the structure of the track and equipment, and in methods of operation, particularly in getting better loads for cars and engines and the lowering of cost through reduction of train and ton mileage.

"The vindication of the wisdom with which the railways have used the new moneys furnished them is that with a doubling of the capital they have quadrupled the movement; that whereas in 1882 it required a capital investment of more than 12 cents to provide for the movement of a traffic unit, in 1905 it required a capital investment of but 5½ cents to provide for this movement.

"That the public has not been unfairly dealt with is evidenced by the fact that whereas in 1882 a charge of 1½ cents was made for the movement of a unit of traffic, in 1905 this charge had been reduced below one cent.

"The problem which is facing the railroads and the people is not how the railroads will be able to maintain this traffic, but how they will be able to handle the enormous traffic which they will be called upon to handle. It is hard to convey an adequate idea of the seriousness of this problem. In the eighties a growth of 10 per cent. in traffic meant an increase of \$5,000,000,000 traffic units per annum, but now it means an increase of nearly 20,000,000,000 traffic units. With a growth of railway mileage which even last year, when the quantity constructed was larger than for many years past, showing an increase over the total of less than 3 per cent., with nineteen-twentieths of the railways only single track lines, and with a large portion of these nearly up to the limit of their carrying capacity; with an equipment absolutely inadequate and being but slowly augmented, owing to the destruction of vast quantities of old and obsolete cars and engines, it seems clear that neither during these years of the past, nor in the immediate future, will the proportionate growth of capital outlays in any way correspond with the proportionate growth of traffic."

In the year 1906, the amount of new securities authorized by the railways was about \$2,700,000,000, and the amount actually issued was but \$1,600,000,000. Of the latter sum, \$500,000,000 was for conversion purposes, so that the net increase in capital securities outstanding was about \$1,100,000,000 par value. This was considerably above the amount realized on sale. Some of the proceeds were paid out on disroads; some used to increase cash on hand or materials in stock, and for other purposes. It is probable that not more than \$800,000,000 was devoted to construction and equipment. To this latter amount should be added a possible \$100,000,000 for construction and betterments contributed by the companies and charged by them to Income or Operating Expenses. This \$900,000,000 is probably distributed as follows:

New lines	\$200,000,000
Additional tracks	125,000,000
New equipment	400,000,000
Terminal facilities	175,000,000
Total	\$900,000,000

Can we afford to vest in any commission the determination of these great questions, fraught with such vital consequences to the prosperity and development of both the railways and the country? Shall not the stockholders be permitted to operate the property owned by them, under such governmental regulations as may be deemed necessary to secure equal service to all, and at rates not unreasonable?

CONCLUSIONS.

Now, gentlemen, I think we have proven:

First.—That a general valuation of railway property such as proposed by the Interstate Commerce Commission cannot lawfully be used for any federal purpose, either of taxation, or of determining the reasonableness of a rate, or of fixing the value of railway securities.

Second.—That before any valuation of railway properties—whether it be the cost of material in place or the value as a "going concern"—can be generally used for purposes of taxa-

tion, it will be necessary to amend the constitutions of several of the states.

Third.—That for the purpose of determining the reasonableness of a rate, the cost of the property to the present holders thereof, and the valuation of the plant as a "going concern," must be ascertained.

Fourth.—That the questions of reasonableness of rates do not arise with regard to the whole of any carrier's business, but as to parts thereof for particular services, and that the only valuation which could be of utility in solving these questions would be of the particular portion of the carrier's property specially employed to perform the service.

Fifth.—That in the determination of the reasonableness of a rate the value to be applied is the *then* value as a "going concern," and a valuation to-day would not apply to conditions existing to-morrow.

Sixth.—That before undertaking a valuation for any purpose, it is not only desirable but necessary that a basis fair to all interests be determined, and that the purpose for which it is to be used shall be clearly defined. It otherwise is susceptible of conversion, as Mr. Shields points out, to mean "nothing more nor less than confiscation."

Seventh.—It is not wise to give any political body the power to write either up or down, at will, the assets of a corporation.

PFLASTERER'S CONTROLLED MANUAL BLOCK SYSTEM

George S. Pfisterer, chief signal officer of the Nashville, Chattanooga & St. Louis—who, by the way, reports direct to the president, although his title is "Inspector"—has patented a controlled manual block system for single-track, in which he provides "control" for permissive as well as absolute blocking; and we understand that the railway company proposes to install the system at some point near Chattanooga. Mr. Pfisterer gave an exhibition of his system last month before the Nashville Association of Railroad Officers, a miniature installation having been set up in the shops of the company. He proposes to have track circuits throughout the length of his block sections, and to so control the signals that he can authorize permissive movements by signals for trains following one another, while at the same time maintaining absolute blocking as against opposing trains; and so locking the signal levers that a signalman can never give a clear signal when he should give a permissive or cautionary signal. That is to say—assuming a line on which trains run eastward from A to B—A can give a permissive signal when the block is occupied by a train which he has sent forward to B, yet cannot give a clear signal; nor can he give either a clear or a permissive signal if the block is occupied by a train which has started from B to A. With this system the delivering of permissive cards to enginemen is made unnecessary, and Mr. Pfisterer hopes therefore to increase the capacity of his line over that of lines where a similar system is used with less complete locking and where the semaphore signals are used for only two indications—clear and stop. In his patent Mr. Pfisterer calls this "Controlled Manual Semi-Automatic Block Signaling." He provides for using intermediate automatic signals where the block sections are long. If there is an interlocking in the block signaled line he would use purple for the night stop indication for diverging routes, thus making it unnecessary for a train ever to pass a red signal at high speed at night.

In connection with this exhibit, Mr. Pfisterer recalled the long record of the use of the space interval on the Nashville, Chattanooga & St. Louis between Wauhatchie and Chattanooga, six miles, four-fifths of which is single track. The records of this line are familiar to old readers of the *Railroad Gazette*. Over it are run the trains of three different companies, and time-table rights and the ordinary dispatchers' "orders" have been unknown here for 20 years. Since June 30, 1888, there have been run 425,855 trains, or an average

of 1,731 a month (and a larger number over the double-track section); and the only collision was one occurring under permissive blocking, where a freight car was damaged to the amount of about \$2. In this installation there are no track circuits, but there is an electric indicator by which, if the operator at B starts to clear a signal for a train to enter the single track line from B to A, when a clear signal has been given at A, he is warned by the ringing of a bell. As one may readily believe, this fine record is due (says President Thomas) to rigid discipline. The plea that good discipline is beyond attainment because a part of the enginemen and trainmen belong to other companies evidently has not found a place in this superintendent's philosophy.

RESERVOIRS FOR PETROLEUM DREGS FOR RUMANIAN STATE RAILWAYS.

In an article published recently by the *Revue Générale des Chemins de fer* are illustrations of storage tanks used on the Rumanian State railways for petroleum dregs and also of an elaborate design for an elevated tank used for filling the oil compartment of the locomotive tender, as these petroleum dregs are used as fuel on this railway. These reservoirs are of a novel construction, which has been arrived at only after many experiments and it is thought they are of sufficient interest to warrant our illustration and some brief description of them.

The reservoirs are of two kinds. One kind serves to store the necessary supply at the station or warehouse. They are filled with the oil dregs brought in by the tank cars. The others are intended to fill the locomotive tanks by gravity.

The passing of the oil dregs from the tank cars to the supply reservoirs and from the latter to the distributing reservoir is accomplished by a system of pipes and sluices, and the passage of the oil dregs from the distributing reservoir to the tender is by gravity.

When these petroleum dregs were first used as fuel for locomotives the Rumanian railways built in several places cisterns with oak staves, made tight by means of clay. These cisterns leaked badly and they were replaced by stone work covered on the inside with a coating of cement. These also were unsatisfactory, as the walls cracked and the oil escaped through the masonry. The railways then decided to replace these reservoirs by others of sheet steel. The storage reservoirs vary in capacity from 200 cubic meters to 2,300 cubic meters. They are of soft sheet steel, with the bottom plates set upon a sand bed surrounded by a low masonry wall. The longitudinal seams are riveted with a double row of rivets and the vertical seams are single riveted. The thickness of the sheets, in order to get a good, tight rivet, is not less than 5 mm. The tanks have no covering to protect them against cold, but are furnished with a steam coil for heating the oil. They are also provided with an indicator and float gage, and a ventilator is placed in the top for the escape of volatile gases.

The distributing reservoir, which is here illustrated in vertical section, is also of sheet steel and is placed on a masonry tower at such height that the oil dregs can run by gravity into the tender. The supply for the tender is drawn from a smaller reservoir, which is called the auxiliary reservoir, and permits the gaging of the quantity of oil distributed to the locomotives. The upper principal reservoir is not protected against the cold, but the dregs flow by a strainer which is surrounded by a heating coil and thence to the auxiliary reservoir, which itself is protected against cold by its situation in the tower, and it maintains the temperature of the dregs obtained from the heating coil above. In the masonry tower there is a vertical boiler and steam pump provided with valves and pipes by the aid of which the oil is forced from the tank cars to the upper reservoir. The drawing represents the distributing reservoir of the Pascani station. The principal reservoir has a capacity of 260 cubic meters; the auxiliary

General News Section.

The Indo-European Telegraph Co., with its connections, has telegraphed direct from Calcutta to London, 6,900 miles, without retransmission. This is said to be the longest distance ever worked either on land or by cable. The number of repeaters employed is not stated.

Representative Dawson, of Iowa, has introduced in Congress a bill for a full-crew law. Representative Hardwick, of Georgia, has introduced a bill fixing the wages and hours of labor of railway telegraphers, and requiring them to be licensed; and another bill to require the use of the block system.

Wireless telegraph stations for use when telegraph wires are out of order have been established at the office of the *Buffalo Evening News*, Buffalo, N. Y., and of the Pabst Brewing Co., Milwaukee. The Waldorf-Astoria hotel in New York and the Bellevue-Stratford in Philadelphia communicate with each other in this way, and also with steamships on the Atlantic ocean.

According to an Indiana paper, engine No. 6,622 of the Cleveland, Cincinnati, Chicago & St. Louis on Wednesday, April 14, hauled 100 empty cars from Paris, Ill., to Terre Haute, Ind., 21 miles, in 85 minutes. The estimated weight of the cars was 1,714 tons. There were 37 box, 3 platform and 60 coal cars; length of train about 4,200 ft., or more than three-quarters of a mile.

The Pennsylvania Railroad reports that on its Pittsburgh division in the month of March 92 per cent. of its passenger trains reached the end of their runs on time. On the whole Western Pennsylvania Grand division, where 8,764 trains were run, 95 per cent. reached destination on time; 98 per cent., however, made their schedule speed, having begun their trip on the division behind time.

The St. Louis & San Francisco announces that by June 1 it will run passenger trains through to and from New Orleans by way of the Louisiana Railway & Navigation Company's line and the New Orleans Terminal Co. A car ferry will be used to cross the Mississippi river at Baton Rouge. For several months the road had expected to reach New Orleans by way of the Yazoo & Mississippi Valley, but the negotiations with that end in view fell through.

The New York Central and the Delaware & Hudson have notified the New York State Public Service Commission at Albany that they will comply with the order recently issued by the commission requiring the use, in the Adirondack forest preserve, of locomotives which will not throw sparks. Each road will have two oil-burning engines this summer. Engines not burning oil will be prepared specially for service in the forests and will be inspected by the Public Service Commission.

President Taft, who has several times expressed the opinion that the work of the Interstate Commerce Commission ought to be divided, separating the judicial from the non-judicial functions, has appointed a committee to examine the proposition with a view, evidently, to preparing an intelligent report on the matter for presentation to Congress next December. The committee consists of the Attorney-General, the Secretary of the Interior, the Secretary of Commerce and Labor and the Solicitor General.

The Railroad Commission of Indiana, following the example of the New York State Public Service Commission, has issued to the electric interurban railways of the state a circular calling for full information as to the discipline and management of the employees of each company. The inquiries include all of the different classes of employees engaged in operating trains, and cover methods of selection and of testing employees' ability, records of good and bad conduct and recognition of proficiency and faithfulness.

The legislature of New York has passed and the Governor has signed two laws to strengthen the law passed last year requiring railway employees to be paid twice a month. The

new acts provide that prosecution of a railway for violation may be carried on in any county along the line of the road, and make violation a misdemeanor subject to a fine of \$100 to \$1,000. The labor commissioner is no longer required to give ten days' notice to a company which he intends to prosecute. The validity of the original law is now being tested in the courts.

An officer of the St. Louis & San Francisco, investigating the telegraph service on the lines of that company, estimates that more than one-third of the telegrams transmitted are unnecessary, and that the average message contains 10 per cent. more words than are necessary. In the month of December last the five relay offices of the road sent and received 240,415 railway messages (and repeated messages apparently are counted but once). *The Frisco-Man*, reporting these facts, prints a number of examples of railway messages which were two or three times longer than was necessary.

At a recent meeting of members of the Brotherhood of Railroad Trainmen in Chicago resolutions were adopted stating that the substitution of electricity for steam power on the railway terminals of the Chicago switching district would add materially to the present dangers to which employees engaged in the switching of freight cars are exposed, and requesting the legislative representatives of the Brotherhood to oppose any legislation providing for any such change. All other lodges of the Brotherhood in Illinois and all classes of railway employees were asked to join in this protest.

The Cleveland, Cincinnati, Chicago & St. Louis by double-tracking its line between Indianapolis and Mattoon, 129 miles, and reducing the steep grades, has been enabled to reduce the number of freight train crews on that division almost two-thirds. Before the double-tracking the road had in its employ 42 regular freight crews; now it has 15. Nineteen men who were conductors are now working as brakemen. An engine is now able to haul from 50 to 75 cars where, before the road was rebuilt, the average load was 30 cars. Also the trains are able to make better time, not being delayed on sidings to make way for superior trains.

The New York State Public Service Commission, Second district, reports that for the month of February, when 50,161 passenger trains were run in the state, 88 per cent. reached division terminals on time, the best record thus far shown by the reports made to the commission. The average delay for each late train was 27.4 minutes. The best percentage for February was reported by the Lackawanna, 97. The best division percentages were: New York, Susquehanna & Western division of the Erie, 100; Northern of New Jersey division and Jefferson division of the same road, 99; Harlem division of the New York Central, 99; New Jersey and New York division of the Erie, 98; Utica division of the Lackawanna, 98.

The Boston & Maine is perhaps the first railway to join in the general undertaking to inform people of the discoveries that tuberculosis can be prevented from spreading, and even cured by the newly discovered methods. The railway does not find its duty in being a healing agency, but it has a plain duty to perform in doing all that it can do to prevent the spread of disease among people using its facilities and who are thrown together by the very act of transportation. George B. Leighton, a retired railway president, is at the head of the New Hampshire Red Cross organization, and this railway work is due to his activities. The method is purely educational and consists in posting at the stations a distinctive Red Cross bulletin of a size 12 in. x 20 in., giving in the fewest possible words the methods of contagion, cure and prevention.

The Buenos Ayres Exhibition.

The International Exhibition of Railways and Land Transport, to be held at Buenos Ayres next year, as announced in these columns last week, will be opened on May 25, and it is

the intention of the Executive Committee to close it on November 25. Applications for admission should reach the Executive Committee by July 31 of this year; and exhibits requiring special foundations or those requiring power or other extensive preparation should be arranged for by June 15. The Secretary is E. Schlatter, Buenos Ayres, Argentine Republic.

Bridge Over Colorado River.

The new five-span single-track bridge of the Arizona & California across the Colorado River at Parker, Ariz., is shown in the accompanying photograph. The railway is projected from a point on the Santa Fe, Prescott and Phoenix, about five miles north of Wickenburg, Ariz., northwesterly to a point on the Santa Fe Coast Lines near Bengal, Cal., 205 miles. The eastern part is in operation as far as the Colorado river, 113 miles. It is to be a low grade line across the Rocky Mountain divide and will be mostly tangent, with easy curves. It is a part of the Santa Fe system. A large mineral development is expected from the construction of this line; part of it is already being realized.

This bridge is a parabolic truss bridge. It was commenced during the latter part of 1907 and was completed last fall. W. B. Storey, Chief Engineer of the Santa Fe, and A. F. Robinson, Bridge Engineer, represented the Santa Fe in the work, but the immediate construction of the bridge was in charge of J. A. Jaeger, Chief Engineer of the Santa Fe, Prescott & Phoenix, assisted by H. L. Fishel, Division Engineer, and Mr. Patton, Bridge Engineer. The steel superstructure was fabricated by the American Bridge Company, New York, steel being ordered under the plans of the Santa Fe System. The bridge was erected by the Missouri Valley Bridge & Iron Co., Leavenworth, Kan., which also had the contract for all the substructure construction. The total length of the bridge is 1,710 feet, consisting of two timber trestle approaches and five river steel spans, each 284 feet long, resting on six concrete piers. The piers were all built with pneumatic caissons, the foundations of the two shore piers being about forty feet below water and the rest from eighty to one hundred feet below low water. The grade line of the bridge is fifty feet above low water and thirty-seven feet above high water, allowing ample room for river steamers to pass below. The site of this bridge is at the foot of one of the canyons of the Colorado, and at the head of a wide valley.

Railway Legislation—"Nothing Doing."

New York put its Public Service Commission into effect January 1, 1908, and Vermont, whose lawmakers assemble in October instead of January, imitated New York the same year. After this start it was predicted that the idea would quickly spread from Portland, Me., to Portland, Ore. Most of the state and territorial legislatures convene early in January of the odd years for a session of 60 to 90 days, and with eight exceptions all have been sitting this winter. But though half the legislatures have already adjourned, and most of the others are winding up, not one enactment on the subject has come from any of them so far. It isn't that advocates have been lacking, or measures haven't been drawn. Bills in that direction have been introduced in a score of states or territories, but there has not been motor power enough behind them to get results.

The legislatures of West Virginia, Indiana, Kansas, South Dakota, Idaho, Utah, Nevada, Oklahoma, Iowa, Nebraska, Colorado, Maine, New Hampshire and New Mexico, in all of which public service commission bills were introduced, have adjourned without passing them. Kansas was the only state

in which the bill was advanced to the dignity of an issue, but it was beaten by the home rulers. The following legislatures, which are still in session, have bills before them: Connecticut, New Jersey, Missouri, Illinois, Minnesota.—*Evening Post, New York.*

Proposed Electrification of Part of the Grand Trunk Pacific Railway.

The following resolution was introduced into the New Brunswick legislature by Hon. J. R. Burchill, on April 14, relative to the proposed electrification of part of the Grand Trunk Pacific Railway:

"Whereas, In the opinion of this house the time has arrived when a vigorous policy of protection and conservation of our forest lands should be adopted, and

"Whereas, The line of the proposed Transcontinental Rail-



Colorado River Bridge; Arizona & California.

way runs through a large area of our forest lands owned by the crown and private corporations and individuals, and it is important that all proper and reasonable means should be had to safeguard those lands through which the proposed railway will pass from devastation by fire, and

"Whereas, The Grand Falls Power Company are now developing the water power at Grand Falls and within a short period will be in a position to supply electric power for manufacturing and other purposes and transmit the same, and

"Whereas, It is estimated by competent engineers that the said power at Grand Falls is capable of developing a minimum of one hundred and twenty thousand electric horse-power, which should be amply sufficient to furnish power to operate the said lines of railway through said timber lands by electricity, besides furnishing sufficient power for manufacturing, lighting and other purposes.

"Therefore resolved, That in the opinion of this house immediate steps should be taken by the government to have a conference with the federal government at Ottawa, the railway commission and the commissioners of the Grand Trunk Pacific Railway Company with a view to requiring the said company to operate its line of railway through the forest lands of New Brunswick by electric power, at which conference all owners of forest lands and other parties interested should have an opportunity of being present, and that the Grand Falls Power Company be also requested to have a representative present at such conference for the purpose of giving such information in regard to the power to be developed at Grand Falls as may be requested.

"And further resolved that a copy of the resolution be signed by Mr. Speaker and forwarded to his honor, the Lieutenant-Governor, with the request that the same be transmitted to His Excellency the Governor-General and council through the proper channel."

The above resolution was passed unanimously on April 17, with an amendment proposed by the premier, J. D. Hazen, to the effect that the province of Quebec be invited to join in the proposed conference, and that the electrification of the International Railway from Campbellton to St. Leonards, 112 miles, also be considered. In commenting upon it editorially, the St. John's *Standard* suggests that the eastern section of the Intercolonial, as well as a considerable stretch of the Canadian Pacific, might also well be considered, inasmuch as they are nearer Grand Falls than some portions of the Grand Trunk Pacific which it is proposed to electrify.

Open Cars N. G.

Robert McCulloch, President of the United Railways of St. Louis, says that the ordinary open street car is no longer suitable for that company's business, and only 50 such cars will be used in St. Louis this summer. All the rest have been discarded and these 50 will be used only when the rest of the company's cars are insufficient to carry the passengers. Mr. McCulloch says that summer cars are "inconvenient, out of date, useless, hazardous and unnecessary. * * * Passengers have to scramble over one another to get into seats, and the use of curtains to protect passengers against rain is not at all satisfactory." The open cars were all right when horses were the motive power, but now the speed of the cars provides the necessary breeze to keep passengers comfortable in hot weather. In the standard cars now in use the windows can be lowered sufficiently to give all necessary or desirable circulation of air.

A Thirty-Year-Old Tie.

Herewith is shown a block cut from one of several railway ties of *lignum vitae* found in the main line of the New York, New Haven & Hartford near Readville, Mass., a few weeks ago. The ties had been in the track for 30 years. At the time of their removal as curiosities the ties were in perfect preservation and the specimen block shows not the slightest



Lignum Vitae Tie Thirty Years Old.

sign of decay. So tightly held are the two spikes that they cannot be removed without destroying the surrounding wood. At the point in the roadbed where the *lignum vitae* ties were found ordinary chestnut ties have been renewed every eight years. It is supposed that the exotic ties came originally as thick planks from South America to Boston and, after de-

livery on the wharf, in some way became mixed with a cargo of ordinary railway ties and were laid without discovery of their character.

Effect of Business Depression on Railways.

Slason Thompson, Manager of the Chicago Railway News Bureau, has gathered statistics showing that the reduction in the annual gross earnings of American railways due to the falling off in business following the panic of 1907, was over 330 millions. This statement is based on reports of earnings for the 12 months ending November 30, 1908, and is published to show the deceptive character of the statement made by the Interstate Commerce Commission, which showed a loss of only



164 1/2 millions. The commission's figures were for the year ending June 30, 1908, thus including four or five months of good business, whereas Mr. Thompson shows 12 months nearly all lean. He calculates the loss in net earnings at 129 millions instead of 111 millions.

The foregoing comparisons are said to be based on reports from companies operating 216,460 miles of line, though a part of the figures for the earlier year (to Nov. 30, 1907) appear to be estimates. Mr. Thompson prints a diagram, reproduced herewith, showing how the gross receipts of American railways for 1908 were distributed.

Lectures at the Hicks Locomotive & Car Works.

With the idea of raising the efficiency of the organization as a whole, F. M. Hicks, founder of the Hicks Locomotive & Car Works, Chicago, has arranged for a series of lectures to be given to its employees by speakers from the Sheldon School of Salesmanship on the basic principles of business success. The first of this course was delivered on Saturday, April 10, at the Hicks works to about 400 mechanics and office men by A. F. Sheldon, President of the Sheldon School. Mr. Sheldon spoke on "The Relation of Employee to Employer," and showed that an institution is best served when all, from the lowest employee to the highest officer, have at heart its success, and the allotted work of each man is performed to the best of his ability.

He brought out that the value of each employee increases as he lessens the amount of supervision that his work requires. The best results from any given effort are secured when all work together as a unit, feeling that the success of not only the institution, but of each individual, depends on the united energy, intelligence and interest of all. In other words, the

interest of all is the net result of the interest manifested by each individual employed.

The other lectures in the course are "The Composite Salesman," "Success Habits" and "Laws of Mutual Success." Copies of the following synopsis of the first lecture were placed in the hands of the foreman for distribution among the employees:

1. A man's success depends on his value.
2. His value depends on the amount of supervision he needs.
3. The amount of supervision depends upon the number of errors of omission and commission that he makes.
4. Errors of omission and commission depend upon the positive and negative forces of mind and body.

Positive forces.

Health
Strength
Loyalty
Ambition
Courage
Honesty

Negative forces.

Disease
Weakness
Disloyalty
Apathy
Fear
Dishonesty

5. A man to be able to reduce his errors of omission and commission must have endurance of body, ability of mind, reliability of soul and action of will.

6. All people are classified into four grades: (a) "I don't care"—indifference; (b) "I hope"—student; (c) "I'll try"—adept; (d) "I will"—master.

7. The results of any business are the sum of the efforts of all its employees, from the lowest to the highest. If the general character of the employees includes a certain amount of indifference, inefficiency, unreliability, and any of the negative qualities, the results will be poor and will react not only on the business but on the character of the man.

International Association for Testing Materials.

The fifth congress of the International Association for Testing Materials will be held in Copenhagen, September 7-11, 1909. The American Society for Testing Materials is affiliated with the International Association.

Railway Business Association.

The membership to date of this association includes 148 manufacturers of railway materials and equipment, contractors in railway construction and dealers in miscellaneous railway supplies. In the *Railroad Age Gazette* of February 26, 1909, appeared a list of 132 members and the following 16 additional ones have been added since that time:

Brill, The J. G. Co., Philadelphia, Pa.
Clow & Sons, W. E., Chicago, Ill.
Dudgeon, Richard, New York.
Edwards, The O. M. Co., Syracuse, N. Y.
Faessler, J. W. Manufacturing Co., Moberly, Mo.
Hart Steel Co., The, Elyria, Ohio
Hartshorn Co., Stewart, East Newark, N. J.
Lake Erie Iron Co., Cleveland, Ohio.
Lobdell Car Wheel Co., Wilmington, Del.
Locomotive Finished Material Co., The, Atchison, Kas.
Lufkin Rule Co., Saginaw, Mich.
McQuesten Co., Geo., Boston, Mass.
Marshall Car Wheel & Foundry Co., The, Marshall, Tex.
Marvin Manufacturing Co., Franklin, Pa.
Railroad Age Gazette, New York.
Springlake Iron Co., Fruitport, Mich.

Gas Producer Tests.

A series of gas producer tests is now being conducted in the mechanical engineering laboratory of the University of Illinois.

The object of these tests is to provide impartial data on the efficiency and operation of small producer plants of this general class, using different grades of anthracite coal. A rather elaborate line of investigation has been planned and the producer plant has been equipped accordingly.

The plant, as installed by the Otto Gas Engine Works, con-

sists of a 60-h.p. suction gas producer with one wet scrubber, gas receiver and a 22-h.p. gas engine. In order to facilitate testing, a Schutte-Koerting steam ejector of 12,000 cu. ft. capacity per hour has been placed beyond the first scrubber and is used to produce the suction in the producer.

The work is proceeding under the general direction of C. M. Garland, instructor in the mechanical engineering laboratory, in co-operation with A. P. Kratz, a graduate student, for whom the work is to constitute a thesis investigation.

"University Extension" for Prevention of Accidents.

The Executive Committee of the Museum of Safety and Sanitation, New York City, has detailed Dr. Wm. H. Tolman, the Director, for field work, and he will start May 1 on a lecturing tour. Railway clubs, chambers of commerce, manufacturers' associations, engineering, insurance and architectural societies and other such organizations may avail themselves of this illustrated exposition of devices and methods for reducing damage suits and preserving efficiency, for the cost of the lantern operator (\$10), if not too far removed from the itinerary.

Steel Ties.

In his annual report, E. H. Utley, General Manager of the Bessemer & Lake Erie, says:

"The use of the steel tie continues to increase our confidence in its utility and I think it is within reasonable bounds to assert that within the next three years the Bessemer road will be double-tracked between Conneaut Harbor and North Bessemer with steel ties, and that by that time the price of first-class white oak wooden ties will be considerably over \$1 each, whereas the steel ties are selling to-day at about \$2, and that the management of the Bessemer road can feel that, aside from the few ties that may be destroyed by reason of derailments (and which have a scrap value of at least half of their purchase price), for the next 20 to 40 years the question of tie renewals will not enter into the calculations of expenses for maintenance of way."

Ten Thousand Miles Without a "Stop."

At Boston on April 12, a 30-h.p. automobile completed a run of 10,074 miles, which the machine had made over the roads of Massachusetts, New Hampshire and Rhode Island since March 18th—25 days—without having its motor stopped. This is published as the world's record for a non-stop run. The machine was a Maxwell four-cylinder touring car. The run was made under the auspices of the Bay State Automobile Association, and it was between Boston and Worcester, Providence, Newburyport, Nashua, Falmouth and South Framingham. There were three drivers, working in eight-hour shifts, and three observers.

Malay Railway Progress.

With the completion in December of the Johore State Railway, which connects with the Federated Malay States Railway, Singapore is now connected by rail with Penang, nearly 500 miles. The Johore State Railway itself is 121 miles long, mostly through swamps and dense jungle. It is said that the work cost less than the estimate of \$6,492,800, or about \$53,660 per mile. In this estimate the 80-lb. rails and the fine rolling stock form large items. The work throughout was done by petty contract. The ruling gradient of 1 per cent., and a minimum curvature of 3 deg., has been strictly followed, thus allowing a speed up to 40 miles an hour. There are 49 girder bridges, while no less than 409 culverts were built. Of the girder spans there are 19 of 100 ft. each, five of these being over the Muar river and three over the Segamat, the remaining 11 being distributed either as double or single spans over the remaining portion of the line. The largest of the locomotives that will be used will have cylinders 15½ x 24 in., with a pressure of 180 lbs., and driver wheels 4 ft. 6 in. in diameter. The length over buffers is 57 ft. 11 in., and the average weight on drivers is 19,300 lbs.

Canadian Society of Civil Engineers.

At a meeting of the Electrical Section on April 22 a paper entitled "The Use of Aluminum as a Conductor" was read by Julian C. Smith.

American Society of Civil Engineers.

At the meeting held April 21 two papers were presented for discussion: "The Maximum Weights of Slow Freight Trains," by C. S. Bissell, M. Am. Soc. C. E., and "Sampittic Surfacing," by W. W. Crosby, M. Am. Soc. C. E. These papers were printed in the February number of Proceedings.

American Society for Testing Materials.

The twelfth annual meeting will be held at the Hotel Traymore, Atlantic City, N. J., on Tuesday to Saturday, inclusive, June 29-July 3, 1909. Special hotel rates have been secured for members of the society and their guests and will hold good till Monday, July 5. Edgar Marburg, University of Pennsylvania, Philadelphia, Pa., is Secretary.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass.; May 11-14, 1909; Richmond, Va.
 AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Scranton, Pa.; May 11; St. Louis, Mo.
 AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS.—R. W. Pope, 33 West 39th St., New York; second Friday in month; New York.
 AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 24 Park Place, New York, May 19, 1909; New York.
 AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—S. F. Patterson, B. & M., Concord, N. H.; Oct. 19, 1909; Jacksonville, Fla.
 AMERICAN RAILWAY ENGINEERING AND MAINT. OF WAY ASSOC.—E. H. Fritch, Monadnock Bldg., Chicago.
 AMERICAN RAILWAY INDUSTRIAL ASSOCIATION.—R. E. Wilson, Ry. Exchange, Chicago; May 11; Cincinnati, Ohio.
 AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, Old Colony Bldg., Chicago; June 16-18, 1909; Atlantic City.
 AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St.; N. Y.; 1st and 3d Wed., except July and August; New York.
 AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., N. Y.; 2d Tues. in month; annual, Dec. 7-10; New York.
 AMERICAN STREET AND INTERURBAN RAILWAY ASSOCIATION.—B. V. Swenson, 29 W. 39th St., New York.
 ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago; April 28, 1909; Cincinnati.
 ASSOCIATION OF RAILWAY CLAIM AGENTS.—E. H. Hemus, A. T. & S. F., Topeka, Kan.; last week in May, 1909; Detroit, Mich.
 ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, Wisconsin Central Ry., Chicago, June 23-25, 1909; Detroit.
 ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. F. Conard, 24 Park Pl., New York; June 22-23; Montreal.
 CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 1st Tues. in month, except June, July and Aug.; Montreal.
 CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, Montreal, Que.; irregular, usually weekly; Montreal.
 CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York; 2d Friday in January, March, May, Sept. and Nov.; Buffalo.
 FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Rich., Fred. & Pot. R.R., Richmond, Va.; June 16, 1909; Old Point Comfort, Va.
 INTERNATIONAL MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., N. Y.; April 27-30, 1909; Louisville, Ky.
 INTERNATIONAL RAILWAY FUEL ASSOCIATION.—D. B. Sebastian, La Salle St. Station, Chicago, June 21-23, 1909; Chicago.
 INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—E. C. Cook, Royal Insurance Bldg., Chicago; June 1-5; Chicago.
 IOWA RAILWAY CLUB.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month, except July and August; Des Moines.
 MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony Bldg., Chicago; June 21-23, 1909; Atlantic City.
 NEW ENGLAND RAILROAD CLUB.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tues. in month, ex. June, July, Aug., and Sept.; Boston.
 NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August; New York.
 NORTH-WEST RAILWAY CLUB.—T. W. Flannagan, Soo Line, Minn.; 1st Tues. after 2d Mon., ex. June, July, Aug.; St. Paul and Minn.
 RAILWAY CLUB OF PITTSBURGH.—J. D. Conway, Pittsburgh, Pa.; 4th Friday in month, except June, July and August; Pittsburgh.
 RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, 12 North Linden St., Bethlehem, Pa.; June 8, New York.
 RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C., Collinwood, Ohio; May 17-19; Chicago.
 ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—Walter E. Emery, P. & P. U. Ry., Peoria, Ill.; Nov., 1909; Washington.
 ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July, and Aug.; St. Louis.
 SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—J. H. O'Donnell, Bogalusa, La.
 SOUTHERN AND SOUTHWESTERN RY. CLUB.—A. J. Merrill, Prudential Bldg., Atlanta; 3d Thurs., Jan., April, Aug. and Nov.; Atlanta.
 TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R. R.R., East Buffalo, N. Y.; September, 1909; Denver.
 WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, 199 Chestnut St., Winnipeg; 2d Mon., ex. June, July and Aug.; Winnipeg.
 WESTERN RAILWAY CLUB.—J. W. Taylor, Old Colony Bldg., Chicago; 3d Tuesday each month, except June, July and August; Chicago.
 WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, Monadnock Bldg., Chicago, 1st Wednesday, except July and August; Chicago.

Traffic News.

One western newspaper says that within two months this year more than 30,000 settlers from the East have located in the state of Washington.

The Missouri House of Representatives has passed a bill to give the State Railroad Commission power to fix passenger as well as freight rates.

Traffic officers of Missouri lines have decided to protest to the Missouri Railroad Commission against the distance tariff on coal, which the Commission has ordered to be applied on May 1.

From May 15 the Southern Storage & Demurrage Bureau will increase from 120 hours to 240 hours the free storage time allowed at New Orleans on coastwise freight in cars, warehouses and on wharves.

The Metropolitan Steamship Line will on May 3 resume running its passenger steamers, the Yale and the Harvard, through between New York and Boston. These steamers start at 5 p. m. and run through in about 15 hours.

The Illinois Manufacturers' Association has adopted resolutions asking the President of the United States, in filling vacancies on the Interstate Commerce Commission, to appoint one or more men whose interests are actively identified with those of the manufacturers and shippers of the country.

The executive committee of the Western Passenger Association has adopted a resolution in favor of abolishing the practice of checking baggage from a traveler's residence to point of destination, which has been adopted in a number of cities. The question is docketed for discussion at the regular meeting of the Association on May 6.

The Wells-Fargo Express Company, under its last contract with the National Railways of Mexico, has a monopoly of the express business throughout nearly the whole of Mexico for a period of ten years. Its operations now cover all the railways except the Mexican (Vera Cruz) Railway. In the contract with the government the company is prohibited from raising its rates except when authorized by the state.

The Corporation Commission of Oklahoma on April 14 announced a hearing on the question of whether the Chicago, Rock Island & Pacific and the St. Louis & San Francisco should not be required to carry freight at single line rates. The hearing will be on May 11. The Chairman of the Commission said that the Rock Island and the Frisco have been fixing some rates that make the cost of transportation over both roads lower than it would be over a single line, and that as the Corporation Commission considers these roads under the same control and management, it does not approve of this practice.

The motor car service which the Chicago & North Western has been giving on its line between Beloit, Wis., and Janesville, has been discontinued, and regular steam train service has been established on the schedules on which the motor car had previously been operated. The North Western has been running on this line a McKeen motor car that had no baggage compartment. The service was used a good deal by commercial travelers with baggage, and all heavy baggage had to be carried on steam trains. It was decided that the car would be better adapted to service elsewhere, and it has been put on the line between Lincoln, Neb., and Fremont.

Officers of the Harriman lines state that while they have asked the Interstate Commerce Commission to modify its order in the Spokane rate case so that it will not apply to these lines, they have no intention, regardless of whether the Commission complies with their petition or not, of withdrawing from business to and from Spokane. Their desire is that the Commission shall not treat the rates that it has ordered applied from Chicago and St. Paul to Spokane as reasonable maximum rates over the long mileage via the Harriman lines, because if this were done it might be construed as making all of the intermediate rates on the Harriman lines prima facie unreasonable. In other words, they do not wish, because they may by their long lines between these points meet the com-

petition over the relatively short lines of the Hill roads, to be compelled to reduce their rates to intermediate points to the same basis.

The Chicago, Rock Island & Pacific and the St. Louis & San Francisco have both announced that, following the example set in Missouri, they will make a maximum passenger rate of 2½ cents a mile in Arkansas, beginning May 1. In Arkansas, as in Missouri, the validity of the state 2-cent fare law is being contested in the federal courts. The roads in that state got an injunction restraining the state from enforcing the 2-cent fare law, and restored their rates to a 3-cent basis. The reduction to 2½ cents is made voluntarily and without any previous understanding with the state officials. There is no doubt that the other lines in Arkansas will also adopt the same rate.

The Attorney-General of the United States, writing to Morris & Co., the Chicago beef packers, and advising them of the discontinuance of the grand jury's inquiry concerning alleged rebating by railways, calls upon Messrs. Morris & Co. to abandon the practice of using arbitrary valuations on dressed beef when making claims against the railways for loss or damage in transportation. It appears that this use of arbitrary values was the basis of the charges made before the grand jury that the railways had made excessive allowances to the packers. The Attorney-General says, however, that this practice began long before rebating was made illegal, and that it is practised by other large packers; and in his belief it was not adopted with the deliberate intent of obtaining unlawful concessions. The Attorney-General proposes to request the Interstate Commerce Commission to prescribe rules for the guidance of the railways in their investigations of claims made upon them for loss or damage of freight.

INTERSTATE COMMERCE COMMISSION.

A common carrier, in order to build up and foster industries on its own lines, cannot lawfully refuse to carry the products of like industries located on connecting lines. (15 I. C. C. Rep. 620.)

Necessity for Specific Complaints.

Charles A. Sanford v. Western Express Co. Same v. Wells Fargo & Co. et al. Opinion by Commissioner Clark.

Where rates generally are attacked all parties should have an opportunity to have notice of the charges which must be met. In these complaints specific rates were attacked and beyond a decision in those respects we cannot legitimately go. In the general adjustment of rates individual instances of seeming discrepancy are noticed which are inexplicable from a cursory examination, but often when such instances are made the subject of specific complaint circumstances and conditions before unknown are brought out tending to justify the apparently unreasonable relation. The Commission consequently moves with great caution in condemning a rate or practice and does so only when the facts before it amply warrant such action. Complaints dismissed.

Rates on Bituminous Coal to Winston-Salem.

Board of Trade of Winston-Salem, N. C., and City of Winston v. Norfolk & Western. Opinion by Chairman Knapp.

Complainants allege that rates on bituminous coal in carloads from the Pocahontas, Va., district to Winston-Salem, N. C., and Durham are unreasonable and ask that defendant be required to establish the same rates to these points that are made by it to points east of Norfolk, Va., and Lynchburg. Reparation is also asked. Circumstances and conditions of transportation are different at main-line points from Lynchburg to Norfolk than at Winston-Salem and Durham on branch lines to the south from the main line, and defendant may make higher charges to the latter points. But under the circumstances shown the rate charged Winston-Salem on soft coal in carloads is unreasonable to the extent that it exceeds \$2.10 per ton, and the charge to Durham is unreasonable to the extent that it exceeds \$2.20 per ton. Reparation is denied.

Competition Determines Express Rates.

Arthur S. Phillips v. New York & Boston Despatch Express Co. Opinion by Commissioner Harlan.

Complainant alleges that defendant's express charge of 60 cents per 100 lbs. from Boston, Mass., to Bristol Ferry, R. I., 58 miles, is unreasonable when compared with defendant's 50-cent charge from Boston to Fall River, 51 miles; and that the Bristol Ferry minimum of 25 cents per package is excessive when compared with the Fall River minimum of 15 cents per package; but the record does not sustain the contention. The dissimilarity in the conditions affecting express traffic to Fall River and Bristol Ferry explains and justifies the relation of the defendant's rates to the two points.

Defendant meets at Fall River the keen competition of another express company, which not only carries express matter to that point at a materially lower rate, but also maintains a minimum charge of 15 cents per package. In addition it performs a free pick-up and delivery service both at Boston and Fall River. Defendant is fairly entitled to adjust its rates to meet this competition, and in doing so cannot be said to be guilty of an undue discrimination against Bristol Ferry, where no such competition exists.

The right of an express company to maintain a free package pick-up and delivery service at one point while not maintaining such a service at another point must necessarily be controlled by the conditions existing at each place. Because such a service is maintained at Fall River, where the volume of the traffic is large and a wagon service can be conducted economically, it by no means follows that a like service must be maintained at Bristol Ferry, where the traffic is small and the cost of keeping up a wagon service might more than absorb all the revenue.

STATE COMMISSIONS.

The Railroad Commission of Illinois has announced that it will give a hearing in Chicago on May 5 on a number of petitions for additions to and changes in its classification of freight. The docket contains 62 proposed changes.

The Erie Railroad has notified the New York State Public Service Commission that it will comply with the order of the Commission requiring a passenger train to be run each way, daily, except Sunday, over the Conesus Lake branch.

The Railroad Commission of Missouri has ordered that, effective April 20, the rate on blasting powder for a distance of 30 miles or less shall not exceed 6 cents per 100 lbs. in carloads or 15 cents per 100 lbs. in less than carloads. The order was issued in the case of the Excelsior Powder Manufacturing Co. against the St. Louis & San Francisco.

The Texas Railroad Commission has issued notice to express companies doing business in that state that it is advised that they are applying on state business certain rules, classifications and rates that they have adopted for interstate business; that this is in violation of orders of the commission; and that if the practice continues the commission will proceed against them.

The Missouri Railroad Commission has ordered that a formal hearing shall be held at Jefferson City on April 28, at which all parties in interest will be given an opportunity to show cause, if any there be, why certain new schedules of freight rates which the commission has prepared shall not be applied. This is in accordance with the plan of the state authorities to fix freight rates just a little higher than those held confiscatory by the federal court.

New York: The Erie Bond Issue.

In re application of the Erie to issue \$30,000,000 bonds.

The Erie having filed application for a modification of the order entered March 2, 1909, by the Public Service Commission, Second district, on its application to issue \$30,000,000 5 per cent. collateral trust bonds, and having also submitted for approval by the commission a collateral indenture, the commission has approved the collateral indenture and has modified its order in the following respects:

The order provided for the refunding of \$11,380,000 of the

coupons accruing during the next five years on the company's general lien and convertible bonds and this refunding had to be agreed to by not less than 90 per cent. of the holders thereof. This has been reduced to 75 per cent.

The order provided for the exchange of the proposed bonds for notes authorized by the commission March 31, 1908, such issue amounting to \$15,000,000, but in such exchange the order provided that the bonds should be exchanged for the notes only on the basis of par value. This provision is now modified to make the exchange of bonds for a like amount in par value of notes, the bonds to net the company in its treasury not less than 87½ per cent. Such modification is granted on the showing that the notes already issued, amounting to \$10,500,000, were sold by the company at or nearly their face value and that since such sale their market value has been about par.

While the order provided that the bonds not issued for refunding purposes may be sold in the market at not less than 87½ and the proceeds used for improvements and additions to the property, the provision in the order for exchange of the bonds for notes on a par basis without deduction was based on a general statement made on behalf of the company which apparently indicated that it was the intention of the company to make the exchange on a par basis. This statement appears to have been erroneous in that it did not take into account the market value discount in the sale of the bonds.

COURT NEWS.

The Supreme Court of North Dakota rendered a decision on April 16 holding constitutional the state law fixing maximum coal rates and enjoining the Northern Pacific, the Great Northern and the Minneapolis, St. Paul & Sault Ste. Marie from continuing to charge their present tariffs and requiring them to adopt the rates fixed by the state.

President Taft has remitted the fine of \$6,000 imposed in the case of Fred L. Pomeroy, Freight Traffic Manager of the New York Central, who was convicted of giving rebates illegally in connection with the sugar rate prosecutions. Mr. Pomeroy died in November, 1906, and the President's action was based on representations that Mr. Pomeroy had left his widow with little or no means of support.

The United States District Attorney at Little Rock has received instructions from the Department of Justice to prosecute the St. Louis, Iron Mountain & Southern on 59 counts for the alleged giving of rebates to T. H. Bunch, proprietor of an elevator at Argenta, Ark. Bunch and Wilbur C. Stith, formerly Traffic Manager of the Missouri Pacific-Iron Mountain System, pleaded guilty to the receiving and the giving of these alleged rebates and were fined.

The Supreme Court of Missouri rendered a decision on April 13 holding that a railway complies with the law requiring it to run a passenger train daily each way over its line when it runs a mixed train including both freight and passenger cars daily each way. The decision was rendered in a case carried up from Benton county, in which the Missouri Pacific was fined \$100 because it did not run daily each way an exclusive passenger train. The Supreme Court reversed the decision of the lower court.

The Atchison, Topeka & Santa Fe is being prosecuted before Judge Landis in the Federal Court at Chicago for alleged violations of the federal law restricting the hours of labor of telegraph operators. The evidence showed that the operators at Corwith, Ill., worked 4½ hours, then were off duty 3 hours and then worked 4½ hours. Counsel for the railway contended that this was a compliance with the law prohibiting operators at day and night stations from being kept on duty more than 9 hours a day. Counsel for the government contended that the 9 hours' service must be continuous. Counsel for the Santa Fe moved that the case be taken from the jury and decided by the court upon the point of law involved, and Judge Landis took the matter under advisement.

Judge Trieber in the Federal court at Little Rock, Ark., on April 19 made a ruling which it is believed establishes a new precedent. He some time ago enjoined the state from

enforcing rates fixed by the Railroad Commission. The railways then fixed rates which were substantially higher than those that had been prescribed by the Commission. The Commission appealed to Judge Trieber against the rates fixed by the railways upon the ground that they were excessive. The court found that the rates fixed by the railways were excessive and ordered them to put in rates that should not be more than one-third more than the rates originally ordered by the Commission. He said that while ordinarily a court has no power to fix rates it has power to fix the rates which shall be charged while litigation involving the question of whether a permanent injunction shall be issued is pending. Passenger rates were not affected.

The Supreme Court of South Carolina on April 13 overruled the demurrer of the Columbia, Newberry & Laurens in the suit of that road opposing the order of the state railroad commission requiring the company to make improvements at Slighs, thus sustaining the statute empowering the commission to make such orders. The commission had ordered the construction of additional tracks at Slighs and the improvement of the station building. It appears that the road carried out the improvements but protested against the legality of the order. In court the company's attorneys argued that the statute should be held unconstitutional because it does not require the commission to give the railway the benefit of a hearing before making a decision, and also because it "attempts to take the whole and entire management of the railways of the state out of the hands of their owners." The court held that, although the statute does not require the commission to give notice of hearing, the constitution does require that a commission shall exercise its power only by due process of law, and this is sufficient. Due process of law requires that the railway shall have opportunity to be heard. The claim that the statute takes the management of the railway property away from the owner is brushed aside as having no foundation.

The Alabama Rate Law.

At New Orleans on Monday of this week the United States Circuit Court of Appeals denied a rehearing in the suits concerning the Alabama rate laws recently decided against the railways. Under these laws passenger fares throughout the state must be not over 2½ cents a mile, and the freight rates on 110 commodities are fixed.

The *Washington Herald*, discussing the action of the court in this case, says:

"An interesting sequel to the remarkable railway war of nearly two years ago in Alabama, wherein the contending forces on one side were Governor Comer and the legislature, and on the other Judge Thomas G. Jones, of the Federal court, and the Louisville & Nashville and other railway companies, has been written in a recent opinion of the United States Court of Appeals for the Fifth Judicial Circuit. In 1907 the Alabama legislature ordered the reduction of railway passenger fares to 2½ cents a mile and the establishment of lower freight rates, besides providing an elaborate system of enforcement, with heavy penalties, the whole warranted injunction proof.

"Judge Jones, a man of strong will and positive views, when applied to by the railways, counsel for which set up the usual pleas of confiscation and destruction of property rights, enjoined the new statutory rates in sweeping decrees directed against every state official. For a time it looked as if there would be open conflict between the Federal court and the state officials.

"Now comes the Court of Appeals to wipe out every one of the injunctions issued by Judge Jones. Since 1907 ex parte injunctions against the regulation and fixing of public service rates have become less frequent and less approved of in our higher courts. The present opinion shows the influence of two recent decisions of the United States Supreme Court. * * * Following the precedent of these two decisions, the Court of Appeals dissolved the injunctions against the Alabama railway rates on the broad ground that no real case of confiscation had been made out. No satisfactory evidence had been presented to the court that the lower rates would

have affected the property rights of the complainants. The evidence before the court consisted merely of affidavits giving opinions as to the effect of rates which had not had a day's trial. Speaking generally of the attitude of the courts the opinion says that 'the courts cannot, as a rule, yield their right of judgment to the opinions of interested experts who are not even subjected to cross examination.' * * *

Nevada Railway Law.

The Nevada legislature at its recent session passed an amendment to the Railroad Commission act giving the Commission full power to regulate passenger fares and freight rates, repealing the maximum rate law and strengthening the powers of the Commission generally. This law has received the governor's signature and is now in effect. The law prohibits the giving or acceptance of free railway passes; but railway employees and their families, ministers of the gospel, and representatives of charitable institutions are excepted.

Passenger Rates in Missouri.

The Chicago, Burlington & Quincy and the Chicago, Rock Island & Pacific last week announced independently that they would reduce their passenger rates in Missouri to 2½ cents a mile. They took this action in the hope that it would conciliate the officers and people of Missouri. Following these announcements, all the railways in Missouri announced 2½ cent rates, effective May 1.

Judge Smith McPherson, of the federal court, who rendered the decision holding the Missouri 2-cent fare law unconstitutional, rendered an amended decree on April 17, in which he reserved exclusive jurisdiction of the Missouri rate cases, and by implication indicated to the state officers who are seeking in the state court at St. Louis to prevent the railways from advancing their passenger rates that they will get themselves into trouble if they do not respect the jurisdiction of the federal court. Attorney-General Major of Missouri has announced that he will prosecute the state's appeal to the Supreme Court of the United States against the decision, holding the 2-cent fare law unconstitutional.

Freight Car Balance and Performance.

Arthur Hale, Chairman of the Committee on Car Efficiency of the American Railway Association, in presenting statistical bulletin No. 42, covering car balance and performance for October, 1908, says:

"During the period covered by this report there was a further decrease in the number of surplus cars, as well as in the number of cars reported in bad order. The surplus good order cars averaged during October 112,974 daily, or 5.28 per cent. of the total equipment on the lines of the companies reporting. Adding 3.85 per cent. as the "excess" shop cars, and adjusting our averages as in previous reports, we secure figures that compare favorably with the performance in normal months.

	Average miles per day.		Average ton-miles per car per day.		Average earnings per car per day.	
	Inc. surp.	Exc. surp.	Inc. surp.	Exc. surp.	Inc. surp.	Exc. surp.
December, 1907	21.9	23.9	289	316	\$1.98	\$2.17
January, 1908	20.8	24.9	277	325	1.81	2.17
February, 1908	19.7	23.8	271	328	1.82	2.20
March, 1908	21.2	25.5	290	348	1.95	2.34
April, 1908	19.6	24.5	258	324	1.83	2.29
May, 1908	19.3	24.8	254	329	1.72	2.22
June, 1908	19.6	24.7	276	347	1.88	2.37
July, 1908	20.0	24.8	275	342	1.84	2.28
August, 1908	20.8	25.1	292	354	1.98	2.40
Septmbr, 1908	22.0	25.2	320	367	2.24	2.57
October, 1908	23.8	25.9	346	376	2.33	2.54

"The miles per car per day, which average 23.8 without the elimination of idle cars, figure 25.9 after the adjustment, indicating an exceptionally good performance by those cars actually in service. There is a similar increase in the ton miles per car per day, which reaches 376 in the adjusted averages, but six tons lower than the record average for October, 1907. The average earnings per car (adjusted) are 3 cents

CAR BALANCE AND PERFORMANCE IN OCTOBER, 1908.

	New York, Del., Md., Eastern Pa.	Ohio, Indiana, Mich., Western Pa.	Virginia, W. Va., No. and So. Carolina.	Ky., Tenn., Miss., Ala., Ga., Fla.	Iowa, Ill., Wis., Minnesota.	Montana, Wyo., Neb., Dakotas.	Kansas, Colo., Okla., Ind. T., Mo., Ark.	Texas, Louisiana, N. Mex.	Idaho, Nev., Cal., Arizona.	Canadian Lines.	Grand total.
Revenue freight cars owned.....	659,393	278,610	133,446	174,065	369,694	15,579	15,579	26,319	111,926	99,922	2,078,312
Average number of system cars on line..	441,040	202,775	91,801	116,747	284,805	6,132	6,132	14,337	59,539	74,617	1,439,668
Railroad-owned cars: Av. foreign on line.	173,046	72,114	30,547	42,439	106,039	12,043	12,043	23,987	42,254	18,986	599,470
Total cars on line	614,086	274,889	122,348	159,186	390,844	18,175	144,494	38,324	101,793	93,603	2,039,140
Excess	8,926	.....	.....	.....	21,150	2,606	7,608	12,015	.....	.....	.....
Per cent. cars on line to total owned:	71	73	69	67	77	39	71	55	53	75	69
Home	26	26	23	24	29	78	35	91	38	19	29
Foreign	93	99	92	91	106	117	106	146	91	94	98
All railroads	40,317	12,437	2,380	6,174	14,353	2,013	7,756	2,222	7,513	4,149	102,282
Total, all cars on line.....	654,403	287,326	124,728	165,360	405,197	20,188	152,250	40,546	108,306	97,752	2,141,422
Per cent. of cars in shop.....	9.60	9.83	8.86	12.61	5.33	3.75	15.38	5.93	5.73	8.42	8.87
No. of freight engines owned.....	9,833	3,794	2,216	2,574	6,274	440	2,485	714	2,325	2,124	33,900
Av. cars on line per freight engine owned	67	76	56	64	65	46	61	57	47	46	63
Total freight-car mileage.....	489,500,133	180,746,066	81,438,108	117,584,079	314,150,660	28,210,210	89,990,194	32,140,668	107,494,969	84,857,742	1,569,401,585
Average miles per car per day.....	24.1	20.3	21.0	22.9	25.2	45.1	19.9	25.6	31.7	28.1	23.8
Per cent. loaded mileage	73.2	68.1	69.8	72.5	73.9	73.0	72.8	72.0	72.2	75.6	70.7
Ton-miles of freight, inc. Co. freight.....	7,325,503,197	2,699,820,319	1,121,302,921	1,629,460,098	2,787,972,865	407,128,080	1,255,533,626	377,404,473	1,581,617,294	1,176,051,756	20,846,972,918
Average ton-miles, including Co. freight:	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Per car-mile	11.2	16.2	13.8	14.1	14.7	14.8	14.0	11.9	14.7	13.8	14.6
Per loaded car-mile.....	15.3	23.9	19.7	18.0	20.2	20.3	19.4	16.6	20.4	18.3	20.8
Per car per day	186	332	290	324	363	694	279	307	467	391	346
Gross freight earnings	\$5,518,764	\$46,615,986	\$16,654,953	\$11,697,110	\$24,041,146	\$3,493,037	\$11,631,839	\$4,106,934	\$14,871,294	\$7,921,531	\$154,939,067
Average daily earnings: Per car owned..	\$2.46	\$2.28	\$1.93	\$2.20	\$2.72	\$7.23	\$2.75	\$5.03	\$4.29	\$2.56	\$2.51
Per railroad-owned car on line.....	2.19	2.45	1.95	2.42	2.60	5.99	2.60	3.46	4.71	2.73	2.57
All cars on line.....	2.11	2.30	1.87	2.33	1.89	5.58	2.47	3.27	4.39	2.61	2.33

lower than during September, although close to the highest averages produced in 1907.

"The resumption of a general car interchange noted in our previous bulletins is quite marked in October, the proportion of cars on their home lines dropping to 69 per cent. as compared with 73 per cent. in September. This movement was naturally accompanied by a further increase in the per cent. of loaded mileage, which reached 70.7 per cent. The increase in tons per loaded car noted in September seems to have been only temporary, and the average for October was 20.8, only slightly higher than July and August."

The Tehuantepec Railway.

The railway across the isthmus of Tehuantepec last year carried across the isthmus 38 million dollars' worth of merchandise in shipments which originated at or were destined for points in the United States. The Panama Railroad during the same time carried 12 million dollars' worth originating in the United States. These figures are given in a report from the Department of Commerce and Labor. The Tehuantepec Railway is 190 miles long. It was built mainly with British capital but is controlled, at least in part, by the Mexican government.

An officer of the Canadian Pacific tells a reporter that he expects to ship wheat to Europe over the Tehuantepec Railway. He has recently visited Mexico and expects that the railway will build grain transferring houses at the Pacific and the Atlantic termini. Lines of steamers already running between Vancouver and Manzanillo could conveniently take wheat to the Tehuantepec road. The proposed wheat shipments are to be made from Alberta. Calgary, the principal city on the Canadian Pacific in Alberta, is about 600 miles east from the Pacific coast.

The Illinois Manufacturers' Association and the Railways.

The Illinois Manufacturers' Association last week issued a "Legislative Bulletin" in which it was charged that the cessation of improvements by the railways and the laying off of employees have not been made necessary by anti-railway agitation and legislation, but by financial mismanagement of the roads. The bulletin was issued in reply to recent addresses by B. L. Winchell, President of the Rock Island, and D. Willard, Vice-President of the Burlington, in which they urged a cessation of anti-railway legislation to give the roads a chance to recover from the effects of the business depression. It was charged specifically in the bulletin that the Burlington and the Rock Island had watered their stock, and that that was the real reason why "18,000 men were turned out by the Burlington to shift for themselves or starve." It was added "that reckless and unconscionable financiering has done a hundred times more injury to the country than all the mistakes of the legislatures."

The bulletin was received with disfavor by some members of the association. Rudolph Ortmann, a member of the association's board of directors, issued a statement in which he said that many of its members did not approve of what had been said. He added: "We are not concerned with the question of whether or not charges made in the bulletin are true, but we severely condemn their being made upon the authority of the association. Many of us regard the circular as scurrilous and undignified as well as ill-advised and extremely unwise. Mud-slinging is not the way that dignified and substantial business men would win their fights."

F. A. Delano, president of the Wabash, wrote a letter to each of the directors of the association, protesting against its tone and asking them if they thought that such attacks better the feeling between shippers and the carriers or help the situation in any way. Some members of the Manufacturers' Association are circulating a petition to its board, strongly condemning the tone of the bulletin and asking them to see that no more such pamphlets are issued.

J. M. Glenn, secretary of the association, has issued a statement defending the charges made in the bulletin and asserting

that the railways are trying to "boss" the association and that the circulation of the petition referred to is due to railway influence. In reply to Mr. Glenn's statement, Mr. Ortmann said that it was untrue that the petition was being circulated at the instance of the railways—that it was not necessary for the railways to tell substantial business men such as belong to the association what is or is not a dignified and business-like manner of carrying out its purposes.

Effect of 2-Cent Fare Legislation on the Rock Island Lines.

Frank Nay, General Auditor of the Chicago, Rock Island & Pacific, has compiled statistics regarding the passenger business of the Rock Island Lines which seem to show with absolute conclusiveness that 2-cent fare legislation has not tended to stimulate the growth of passenger traffic. The Rock Island lines have mileage in 13 states. The statistics that Mr. Nay has compiled show that while the number of passengers carried one mile during the fiscal year ended June 30, 1908, was greater in every state than in the preceding year, except one, the increase in passengers carried was proportionately as great in the states where 3 cents a mile or more was the fare as in the states where the 2-cent fare was in effect. It is a curious fact that in New Mexico, where the fare was 4 cents a mile, the increase in passengers carried was the greatest. The revenue from passenger traffic decreased in every state where the 2-cent fare was in effect and the revenue from passenger traffic increased in every state where the 3-cent fare was in effect. The following statistics show results on the entire system, figures for decreases being indicated by asterisks:

	State.	Interstate.	Total.
Pass. 1 mile, year ended Jun. 30, '08.	383,765,426	498,225,918	881,991,344
Pass. 1 mile, year ended Jun. 30, '07.	346,223,377	379,010,129	725,233,506
Increase	37,542,049	119,215,789	156,757,838
Per cent. of increase	10.8	31.5	21.6
Pass. rev., year ended Jun. 30, '08.	\$7,343,016	\$9,350,095	\$16,693,110
Pass. rev., year ended Jun. 30, '07.	8,019,461	8,134,079	16,153,539
Increase or decrease	676,445*	1,216,016	539,571
Per cent., increase or decrease ..	8.4*	14.9	3.3
Av. revenue per passenger per mile:			
For year ended June 30, 1908....	\$1.91	\$1.88	\$1.89
For year ended June 30, 1907....	2.32	2.15	2.23
Decrease	6.41*	0.27*	*0.34
Per cent. of decrease	17.7*	12.6*	*15.2
Loss in revenue, from decrease in rates, year ended June 30, 1908 (pass. 1 mile multiplied by decrease)	†\$1,616,337	†\$1,382,433	†\$2,998,771

*Decrease. †These will not figure exactly owing to omission of fractions.

The following is a statement of percentages of increase and decrease in state (intrastate) passenger traffic by states for the roads comprising the Rock Island lines for the fiscal year ended June 30, 1908, compared with the results for the fiscal year ended June 30, 1907, percentages for decreases being starred.

	Pr ct. of inc. or dec. Passengers 1 mile. Passengers revenue.	
States in which 2-cent maximum passenger fare became effective just prior to the early part of fiscal year ended June 30, 1908:		
Illinois	2.5	14.1*
Iowa	25.0	2.4*
Nebraska	11.7	14.6*
Missouri	22.4	7.4*
Kansas	1.0	19.8*
Oklahoma	10.8	8.8*
Minnesota	18.7	10.7*
Arkansas	2.6	22.3*
Total, for 2-cent states	10.9	11.0*
States in which the maximum passenger fare was 3 cents or 4 cents (as indicated) during two years ended June 30, 1908:		
Colorado	3 cents	23.4
Dakota	3 "	32.7
Louisiana	3 "	0.8*
Texas	3 "	3.8
New Mexico	4 "	51.4
Total for 3-cent and 4-cent states	9.8	16.1

*Decrease.

It is believed that the foregoing statistics are the most complete and accurate that have ever been made public regarding the effect of reductions in passenger fares.

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF FEBRUARY, 1909.
(See also issues of April 9 and 16.)

Mileage operated at end of period.	Name of road.	Operating revenues				Operating expenses				Net operating revenues (or deficit).	Outside operations, net.	Taxes.	Income (or loss).	Increase (or dec.) last year.
		Freight.	Passenger.	Total.	Inc. misc.	Way and structures.	Maintenance of equipment.	Traffic.	Portation.						General.	Total.
309	Alabama Great Southern.....	\$182,969	\$67,408	\$281,813	\$281,813	\$28,704	\$50,861	\$7,684	\$93,755	\$8,214	\$191,248	\$11,480	\$78,541	\$50,075
301	Ann Arbor.....	69,222	26,133	104,388	104,388	17,127	13,310	2,824	55,884	3,901	93,046	11,369	299	3,442
642	Atlanta, Birmingham & Atlantic.....	132,148	28,907	172,770	172,770	25,668	32,881	12,639	78,311	8,219	151,908	8,000	12,862	14,543
515	Bangor & Aroostook.....	208,645	30,535	249,180	249,180	40,474	25,911	2,683	78,311	10,663	158,042	1,500	90,253	44,270
411	Central Vermont.....	163,285	52,159	237,598	237,598	22,634	37,742	6,451	128,909	6,552	202,288	349	23,159	24,291
340	Charleston & Western Carolina.....	100,066	18,560	125,356	125,356	21,495	14,520	2,469	41,441	7,614	84,082	4,100	37,174	9,899
270	Chicago & Erie.....	255,956	55,110	343,665	343,665	18,418	80,531	11,493	174,562	37,019	292,618	218	40,182	19,734
818	Chicago Great Western.....	379,909	123,791	557,885	557,885	61,927	170,407	35,558	315,034	76,766	619,945	62,360*	83,802*	18,160
329	Chicago, Indiana & Southern.....	209,291	14,701	230,800	230,800	19,354	45,736	6,361	95,014	5,328	173,411	365*	44,614	110,724
670	Chicago, Lake Shore & Eastern.....	252,523	.....	280,585	280,585	28,342	73,130	1,281	89,406	7,826	197,966	.....	79,619	65,950
492	Chicago, Rock Island & Gulf.....	181,703	58,009	251,391	251,391	18,317	115,291	5,971	89,406	8,065	182,311	.....	112,819	35,923
337	Cincinnati, New Orleans & Texas Pac.....	106,076	19,208	154,755	154,755	21,491	26,884	9,944	74,401	18,036	139,289	.....	191,814	115,682
438	Colorado Midland.....	128,551	53,618	195,620	195,620	25,591	19,473	2,294	53,518	18,500	104,636	.....	7,291	12,769
454	Detroit, Toledo & Ironton.....	267,536	49,925	397,594	397,594	29,461	27,316	6,341	84,293	15,178	282,010	.....	21,440*	7,732
307	Duluth, South Shore & Atlantic.....	105,742	51,288	156,839	156,839	19,735	24,486	5,338	66,890	8,122	124,511	.....	53,795	30,907
395	Georgia Southern & Florida.....	123,309	24,044	156,839	156,839	34,218	19,922	1,093	133,605	15,349	178,718	.....	37,716	25,369
347	Gulf & Ship Island.....	282,436	52,262	351,929	351,929	46,875	77,164	7,064	133,605	12,631	277,339	.....	71,036	7,864
789	Hocking Valley.....	280,920	93,045	405,240	405,240	106,467	106,980	19,556	272,691	17,357	527,210	.....	78,616	115,834
1,159	Houston & Texas Central.....	453,558	128,390	622,826	622,826	73,411	104,523	10,234	265,680	17,735	491,583	.....	17,000	16,870
392	International & Great Northern.....	177,984	279,169	477,155	477,155	11,924	39,133	1,761	69,209	10,581	122,613	.....	21,714	15,726
386	Long Island.....	110,846	26,413	146,265	146,265	11,924	39,133	1,761	69,209	10,581	122,613	.....	21,714	15,726
403	Mason City & Fort Dodge.....	86,121	22,603	117,815	117,815	21,616	15,334	1,846	37,814	10,041	86,651	.....	15,726	16,870
351	Mobile, Jackson & Kansas City.....	232,812	95,468	352,623	352,623	52,155	32,277	7,333	132,156	13,284	240,205	.....	27,955	26,473
462	Morgan's La. & Tex. R.R. & S.S. Co.....	601,273	132,622	787,803	787,803	126,394	207,631	13,783	411,776	20,626	779,610	.....	96,302	27,577
351	Northern Central.....	148,254	41,450	210,279	210,279	18,661	46,914	5,535	87,394	4,532	163,036	.....	38,443	16,404
468	Peoria & Eastern.....	104,242	55,968	186,004	186,004	22,815	32,877	5,225	80,505	8,841	150,266	.....	27,957	16,003
454	Rutland.....	60,986	41,824	109,301	109,301	17,460	15,742	3,190	38,296	9,356	80,783	.....	24,577	16,003
450	St. Louis, Brownsville & Mexico.....	188,096	68,827	277,461	277,461	54,446	25,849	8,077	104,140	9,316	211,323	.....	59,979	26,805
441	Texas & New Orleans.....	185,896	29,376	293,701	293,701	30,697	59,455	4,442	93,195	4,738	192,593	.....	26,261	19,819
451	Toledo & Ohio Central.....	192,886	20,164	298,701	298,701	25,212	28,700	6,200	93,307	7,798	160,583	.....	66,618	10,819
356	Toledo, St. Louis & Western.....	97,842	164,557	283,328	283,328	60,291	60,291	6,900	93,207	7,010	202,412	.....	29,268	10,819
442	West Jersey & Seashore.....	333,373	92,157	582,268	582,268	27,973	93,694	5,885	148,226	15,889	500,961	.....	72,347	17,454
271	Wheeling & Lake Erie.....	30,233	11,352	46,146	46,146	10,505	3,469	5,808	22,573	15,289	37,364	.....	5,190	11,864
309	Alabama Great Southern.....	\$1,592,967	\$697,471	\$2,403,718	\$2,403,718	\$210,731	\$462,646	\$59,975	\$800,857	\$66,392	\$1,700,001	\$91,796	\$605,850	\$263,178
301	Ann Arbor.....	753,614	312,312	1,551,092	1,551,092	164,269	148,297	24,187	469,755	52,672	1,400,610	.....	231,357	18,248
642	Atlanta, Birmingham & Atlantic.....	1,418,343	312,274	2,386,854	2,386,854	170,464	249,504	76,863	577,629	72,672	2,061,379	.....	230,845	7,290
515	Bangor & Aroostook.....	1,434,066	380,133	2,590,135	2,590,135	330,530	383,301	53,886	1,000,655	53,886	1,919,031	.....	320,122	292,417
411	Central Vermont.....	1,632,851	521,591	2,837,445	2,837,445	226,388	377,742	6,451	1,289,909	21,785	2,429,494	.....	100,901	93,976
340	Charleston & Western Carolina.....	1,000,666	18,560	1,253,556	1,253,556	21,495	14,520	2,469	41,441	41,404	84,082	.....	37,174	9,899
270	Chicago & Erie.....	255,956	55,110	343,665	343,665	18,418	80,531	11,493	174,562	68,502	343,178	.....	31,050	29,516
818	Chicago Great Western.....	379,909	123,791	557,885	557,885	61,927	170,407	35,558	315,034	41,404	619,945	.....	581,009	137,530
329	Chicago, Indiana & Southern.....	209,291	14,701	230,800	230,800	19,354	45,736	6,361	95,014	5,909	180,362	.....	367,008	150,145
670	Chicago, Lake Shore & Eastern.....	252,523	.....	280,585	280,585	28,342	73,130	1,281	89,406	6,434	217,971	.....	893,209	350,155
492	Chicago, Rock Island & Gulf.....	181,703	58,009	251,391	251,391	18,317	115,291	5,971	89,406	7,733	247,218	.....	967,539	381,191
337	Cincinnati, New Orleans & Texas Pac.....	106,076	19,208	154,755	154,755	21,491	26,884	9,044	74,401	12,565*	133,783	.....	332,453	136,688
438	Colorado Midland.....	128,551	53,618	195,620	195,620	25,591	19,473	2,294	53,518	8,234	161,606	.....	367,008	150,145
454	Detroit, Toledo & Ironton.....	267,536	49,925	397,594	397,594	29,461	27,316	6,341	84,293	11,709	387,179	.....	1,333,068	435,141
307	Duluth, South Shore & Atlantic.....	105,742	51,288	156,839	156,839	19,735	24,486	5,338	66,890	66,349	193,487	.....	374,858	135,147
395	Georgia Southern & Florida.....	123,309	24,044	156,839	156,839	34,218	19,922	1,093	133,605	57,012	210,617	.....	381,911	116,557
347	Gulf & Ship Island.....	282,436	52,262	351,929	351,929	46,875	77,164	7,064	133,605	68,682	483,242	.....	381,911	116,557
789	Hocking Valley.....	280,920	93,045	405,240	405,240	106,467	106,980	19,556	272,691	58,129	638,794	.....	381,911	116,557
1,159	Houston & Texas Central.....	453,558	128,390	622,826	622,826	73,411	104,523	10,234	265,680	96,455	2,061,379	.....	381,911	116,557
392	International & Great Northern.....	177,984	279,169	477,155	477,155	11,924	39,133	1,761	69,209	12,610	210,617	.....	381,911	116,557
386	Long Island.....	110,846	26,413	146,265	146,265	11,924	39,133	1,761	69,209	12,610	210,617	.....	381,911	116,557
403	Mason City & Fort Dodge.....	86,121	22,603	117,815	117,815	21,616	15,334	1,846	37,814	12,610	210,617	.....	381,911	116,557
351	Mobile, Jackson & Kansas City.....	232,812	95,468	352,623	352,623	52,155	32,277	7,333	132,156	12,610	210,617	.....	381,911	116,557
462	Morgan's La. & Tex. R.R. & S.S. Co.....	601,273	132,622	787,803	787,803	126,394	207,631	13,783	411,776	96,455	2,061,379	.....	381,911	116,557
351	Northern Central.....	148,254	41,450	210,279	210,279	18,661	46,914	5,535	87,394	96,455	2,061,379	.....	381,911	116,557
468	Peoria & Eastern.....	104,242	55,968	186,004	186,0									

Railroad Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

J. H. Campbell, Acting General Counsel of the Grand Rapids & Indiana, has been appointed the General Counsel.

Edward S. Keeley, Freight Traffic Manager of the Chicago, Milwaukee & St. Paul, has been elected the Fourth Vice-President, a new office.

Chester M. Dawes, General Solicitor of the Chicago, Burlington & Quincy, has been appointed the General Counsel, succeeding the late J. W. Blythe.

William H. Field, Treasurer of the Houston & Texas Central, has resigned, effective May 31. He has been connected with that road since March, 1902.

Edward M. Hyzer, whose appointment as the General

Counsel of the Chicago & North Western, with office at Chicago, was announced in these columns in our issue of April 2, was born on December 10, 1854, at Janesville, Wis. He was educated in the public schools and studied law under the late Judge John B. Cassoday, of the Wisconsin Supreme Court. He was admitted to the bar in 1879. For the past ten years he has been the Wisconsin attorney for the Chicago & North Western. He was also at the time of his appointment as General Counsel a member of the law firm of Cary, Upham & Black, of Milwaukee, Wis., with which he had been connected for the past six years.



E. M. Hyzer.

Edwin Gould, President of the St. Louis Southwestern, has been elected also the President of the Wheeling & Lake Erie, succeeding F. A. Delano, resigned.

Barton Corneau has resigned as General Attorney of the Chicago & North Western to become Special Assistant to the Solicitor General of the United States, Lloyd W. Bowers, who was formerly General Counsel of the Chicago & North Western.

J. C. Vinson has been appointed the Auditor of the Sonora Railway, the Cananea, Yaqui River & Pacific, the Arizona Eastern, the Gila Valley, Globe & Northern, the Arizona & Colorado, the Maricopa & Phoenix and the Phoenix & Eastern, with office at Tucson, Ariz., succeeding W. G. Sherlock, resigned.

Operating Officers.

H. W. Baldwin has been appointed the Trainmaster of the Cincinnati division of the Erie, succeeding R. E. Woodruff, promoted.

S. J. Polhemus has been appointed an Assistant Superintendent of the Pullman Company, with office at Buffalo, N. Y., succeeding Edward Cox.

J. R. Harrington has been appointed the General Superintendent of the Columbus, Delaware & Marion (electric), with office at Columbus, Ohio.

J. B. Sparks has been appointed the Superintendent of the line between Orendain and Tequila, Mex., of the Cananea, Yaqui River & Pacific, with office at Guadalajara, Mex.

P. W. Drew, Superintendent of Telegraph of the Wisconsin Central, has been appointed the Superintendent of Telegraph of the Chicago division of the Minneapolis, St. Paul & Sault Ste. Marie, with office at Chicago. (See explanatory item under Traffic Officers.)

Traffic Officers.

Don Morrison has been appointed a Commercial Agent of the Minneapolis & St. Louis and the Iowa Central, with office at Winnipeg, Man.

John J. Mossman, General Agent of the Wabash at Buffalo, N. Y., has been elected also the President of the Canadian Freight Association.

C. F. Vigor has been appointed a Traveling Freight Agent of the Minneapolis & St. Louis and the Iowa Central, with office at Cincinnati, Ohio.

W. H. Allen, District Passenger Agent of the Wisconsin Central at Pittsburgh, has been transferred as District Passenger Agent to New York, succeeding H. S. Head.

S. C. Payson has been appointed a General Agent of the Atchison, Topeka & Santa Fe, in charge of freight and passenger traffic, with office at San Diego, Cal.

George A. McFarland has been appointed a General Agent of the Wabash, with office at 515 Francis street, St. Joseph, Mo. This is a new agency established on April 15.

W. A. Nelson, General Agent, Freight department, of the Erie, with office at Jamestown, N. Y., has been appointed a Commercial Agent of the Erie Despatch, with office at Chicago.

J. K. Hudson has been appointed the General Freight Agent of the Detroit & Mackinac, with office at Bay City, Mich. W. G. MacEdward has been appointed the General Passenger Agent, with office at Bay City.

S. W. Bradford, Traveling Freight Agent of the Missouri Pacific-Iron Mountain Lines, has been transferred to Pittsburgh, Pa., succeeding D. C. Wood, Traveling Freight Agent, who succeeds Mr. Bradford, with office at San Antonio, Tex.

A. N. Brown, General Freight Agent of the El Paso & Southwestern System, has been appointed also the General Passenger Agent, succeeding V. R. Stiles, resigned. He will have charge of both passenger and freight traffic and will have the title of General Freight and Passenger Agent, with office at El Paso, Tex. Eugene Fox, General Agent, Freight and Passenger departments, with office at Chicago, has been appointed the Assistant General Freight Agent, with office at El Paso. F. W. Pullen, Chief Clerk in the general traffic department at Chicago, succeeds Mr. Fox, with office at Chicago.

Effective May 1, the name of the Wisconsin Central will be changed to the Minneapolis, St. Paul & Sault Ste. Marie, Chicago division, and the general offices will be moved from Chicago to Minneapolis, Minn. A two-story addition to the office building of the Soo Line at Minneapolis is now being completed for this change. J. C. Pond, General Passenger Agent of the Wisconsin Central, will keep his headquarters at Chicago, with the title of Assistant General Passenger Agent. F. E. Signer, General Freight Agent, and V. L. Freeland, Assistant General Freight Agent, have been appointed to similar positions respectively with the Soo, and will make their headquarters at Chicago. The headquarters of E. G. Clark, Assistant General Freight Agent, have been transferred to Minneapolis.

Engineering and Rolling Stock Officers.

T. J. Raycroft, General Foreman of the Chicago, Burlington & Quincy, has been appointed the Master Mechanic of the Sterling division, with office at Sterling, Colo., succeeding E. D. Andrews, transferred.

M. C. Blanchard, Acting Roadmaster of the Atchison, Topeka & Santa Fe, has been appointed a Roadmaster, with office at Newton, Kan. L. Bradley, who has been on a leave of absence, has been appointed Roadmaster of the M. & M. and Little River districts, succeeding F. Powers, Acting Roadmaster, assigned to other duties. The headquarters of Roadmaster William Eglinton have been moved from Arkansas City, Kan., to Mulvane.

OBITUARY.

Capt. Benjamin F. Bond, Special Passenger Agent of the Baltimore & Ohio, died April 19 at Baltimore from heart disease. He began railway work as clerk in the freight office of the Baltimore & Ohio at Baltimore, and at the time of his death had worked for the Baltimore & Ohio for 44 years.

Railroad Construction.

New Incorporations, Surveys, Etc.

ALASKA CENTRAL.—A contract is said to have been given to Watson & Snow to finish 20 miles of this line, on which grading has been completed, from mile 52 north to mile 72. Track laid on the line from Seward, Alaska, north to Turnagain bay, 52 miles.

ALGOMA CENTRAL & HUDSON BAY.—The Ontario government has granted a subsidy of \$5,000 per mile for 30 miles of line on the Manitoulin & North Shore, between Little Current, Ont., and Sudbury. (March 19, p. 659.)

AUGUSTA, GREGORY & SOUTHERN.—Incorporated in Arkansas, with \$200,000 capital, to build from Augusta, Woodruff county, south about 14½ miles to the extension of the Missouri & North Arkansas. The directors include: J. L. Comer, M. Gregory, R. H. Fitzhugh, T. E. Bonner, I. J. Story, T. E. Stanley, H. M. Wood, E. Roddy and A. H. Campbell.

BANGOR & AROOSTOOK.—This company has renewed the petitions for three important branches in Aroostook county as follows:

From Masardis, Me., on the Ashland Junction-Fort Kent line, northeast to a connection with the main line at Stockholm, about 48 miles.

From Ft. Kent west to St. Francis, 15 miles.

From Ft. Kent east through Frenchville to Madawaska, thence southeast via Grand Isle to Van Buren, 40 miles.

CHICAGO & NORTH WESTERN.—Plans for track elevation on the south side of Milwaukee, Wis., are said to have been approved by the City Engineer. The work is to be started at once.

CHICAGO, MILWAUKEE & PUGET SOUND.—According to press reports, this company is making surveys for a branch from Beverly, Wash., south along the west shore of the Columbia river, thence along the eastern slope of Gable mountain to Hanford.

COOS BAY, OREGON & IDAHO.—Incorporated in Oregon, with \$25,000 capital, to build an electric or steam line from Coos Bay, Ore., east via Roseburg to Boise, Idaho. The incorporators include W. Grimes, J. C. Gray, H. Sengstacken, J. V. Pugh, J. R. Smith and P. Hennessey. Company headquarters at Marshfield, Idaho.

GREAT NORTHERN.—Plans have been filed, and it is said that work will be begun at an early date on the proposed line from Winnipeg, Man., south to Noyes, Minn.

HAMPSHIRE SOUTHERN.—Projected from Romney, W. Va., southwest to Petersburg, about 40 miles. W. B. Conwell, Pres., Fairmount, W. Va.

HARRISON & MINERAL BELT.—Contract said to have been let to A. T. Clements, contractor, Vineyard, Ark., for work from Appleton, Ark., north to Harrison. (April 16, p. 871.)

IDAHO NORTHERN.—Press reports indicate that about 40 miles of extensions will be built this year.

KANSAS CITY, MEXICO & ORIENT.—An officer writes that work has been resumed between Sweetwater, Texas, and San Angelo, 78 miles, and it is expected to have this section finished within the next few months. All the grading has been done and track-laying, bridge building, etc., now under way. Work under way on passenger and freight stations at San Angelo.

Press reports quote President Stilwell as having said that trains will be in operation from Kansas City, Mo., southwest to San Angelo, Tex., by August 1, and that it is expected that the Pacific coast extension will be completed next year.

MANITOULIN & NORTH SHORE.—See Algoma Central & Hudson Bay.

MISSOURI PACIFIC.—Press reports from Kansas City, Mo., indicate that contracts have been let for ballasting the line between Kansas City, Kan., and Pueblo, Colo.; also between Coffeyville, Kan., and Little Rock, Ark., and between Little Rock and Leeper.

NEBRASKA, KANSAS & SOUTHERN.—The Kansas Railway Construction Company has a contract to build this line from Garden City, Kan., northeast to Stockton, 162 miles. According to press reports the grading work from a point 16½ miles northeast of Garden City to Stockton has been sublet to Scott & Smith, contractors, Memphis, Tenn., and St. Louis, Mo. (March 19, p. 656.)

NORTH COAST.—According to press reports, grading contracts have been given to Casse & Eschbach and to Contractor Dingle on a 12-mile section from Kiona, Wash., west to Grand View. Between Kennewick and Grand View, near Prosser, a large amount of grading is yet to be done, including some heavy cuts and fills. R. E. Straborn, Pres. and Gen. Mgr., Spokane, Wash. (Aug. 14, p. 741.)

PENNSYLVANIA SYSTEM.—The record of the mileage of the road on December 31, 1908, shows that the total length of main line on the Lines East of Pittsburgh and Erie is 5,314 miles, with 1,823 miles of second track, 569 miles of third track, 467 miles of fourth track, and 4,251 miles of sidings, a total of 12,424 miles. There was an increase during 1908 of 20 miles of first track, 26 miles of second track, 2.5 miles of third track, 10.5 miles of fourth track and 21 miles of sidings, a total increase of 80 miles. On the lines west of Pittsburgh the mileage is 2,914 miles of first track, 1,192 miles of second track, 183 miles of third track, 87 miles of fourth track and 2,307 miles of sidings, a total mileage of 6,683 miles. During the year there was an increase of 5 miles of first track, 9 miles of second track, 7 miles of third track, 2.5 miles of fourth track and 23.5 miles of sidings, a total increase of 47 miles. The mileage of the Vandalia Railroad is: First track, 925.5 miles; second track, 82 miles; third track, 8.5 miles, and sidings, 643 miles, a total of 1,659 miles. During the year there was an increase of .19 of a mile of first track, 14.15 miles of second track, 8.34 miles of third track and 5.66 miles of sidings, making a total increase of 28.34 miles. The grand total of all lines, including those operated by and associated in interest with the Pennsylvania Railroad, is 11,235 miles of first track, 3,327 miles of second track, 785 miles of third track, 564 miles of fourth track and 8,066 miles of sidings, a total of 23,977 miles. Of this 6,287 miles of first track are east and 4,948 miles are west of Pittsburgh and Erie.

PENSACOLA, ALABAMA & TENNESSEE.—According to press reports, plans are complete to build the first 10 miles of an extension towards Mobile, Ala.

ST. LOUIS, OKLAHOMA & TEXAS.—Location surveys said to be under way on about 100 miles from Mt. Vernon, Texas, northwest; also south of Mt. Vernon. M. J. Smith, Ch. Engr., McAlester, Okla. R. C. Sturgeon is in charge of the surveys.

SAN ANTONIO & RIO GRANDE.—Press reports from Houston, Texas, indicate that 11 miles of track have been laid in Hidalgo county. Connection will be made with the San Antonio & Aransas Pass at Falfurrias, in Starr county. (March 19, p. 657.)

SOUTH BRUNSWICK.—Organized in Virginia, with \$55,000 capital, to build from a point on the Southern east of Lawrenceville, in Brunswick county, Va., south to a point on the Seaboard Air Line, near Garysburg, N. C., about 25 miles. P. D. Camp, Pres., and J. C. Williams, Gen. Supt., Franklin, Va.

SOUTHERN.—According to press reports, W. J. Oliver, contractor, Knoxville, Tenn., is to resume work on the double track improvements from Lynchburg, Va., to Durmid, and from Asheville, N. C., to Craggy. The latter work includes the construction of a concrete viaduct over the French Broad river at Asheville. About one year will be required to complete the contracts, which were suspended about 18 months ago.

TENNESSEE, ALABAMA & KENTUCKY.—Incorporated in Tennessee to build from Louisville, Ky., south to Chattanooga, Tenn.

WISCONSIN & NORTHERN.—This company is said to have plans complete for building 30 miles this summer to complete the line from Shawano, Wis., north to Crandon. All grading is finished except on two miles. (Oct. 23, p. 1228.)

Railroad Financial News.

ATCHISON, TOPEKA & SANTA FE.—The Kansas Railroad Commission have approved the issue of \$73,770,000 stock previously authorized by the stockholders and set aside to provide for the conversion of \$47,714,000 4 per cent. convertible bonds of 1905-1955 and \$26,056,000 5 per cent. of 1907-1917.

BOSTON & MAINE.—Governor Draper, of Massachusetts, sent to the legislature April 21 a message relating to the railway situation. It suggests the creation of a corporation which, under limitations, shall have the right to purchase and hold stock in the Boston & Maine, with power, temporarily or otherwise, to finance such corporations. He suggests that if a charter is granted its power be strictly limited. Among other things, it shall be provided that a majority of the directors of the corporation shall at all times be citizens of Massachusetts. The corporation shall have its principal office and place of business in Boston. The Governor suggests that if such a corporation is authorized it could acquire the \$11,000,000 Boston & Maine stock recently sold by the New York, New Haven & Hartford. The New Haven company officials are said to favor such a bill.

BUFFALO & LACKAWANNA TRACTION.—See Buffalo & Lake Erie Traction.

BUFFALO & LAKE ERIE TRACTION.—The New York Public Service Commission, Second district, has authorized this company to lease for 999 years the property of the Buffalo & Lackawanna Traction. The Buffalo & Lake Erie Traction runs from Erie, Pa., to Buffalo, N. Y., entering Buffalo over the tracks of the Buffalo & Lackawanna Traction.

ERIE.—See an item in regard to the issue of bonds by this company under State Commissions.

GRAND TRUNK.—A full year's dividend of 5 per cent. has been declared on the first preferred stock, and a half year's dividend of 2½ per cent. has been declared on the second preferred. In 1908 dividends on both these stocks were deferred.

GREAT NORTHERN.—The company has sold \$2,131,000 Eastern Railway of Minnesota, Northern division, first mortgage 4 per cent. bonds of 1898-1948 to Clark, Dodge & Co., Lee Higginson & Co. and Moffat & White. There were in January, 1909, \$9,700,000 of these bonds outstanding.

KEOKUK & DES MOINES.—A dividend of 1 per cent. on the \$1,524,600 preferred stock has been declared payable May 1. In 1908 1¼ per cent. was paid on this stock, and from 1905 to 1907 nothing was paid. A majority of the capital stock of the company is owned by the Chicago, Rock Island & Pacific.

MEXICAN RAILWAY.—Glyn, Mills, Currie & Co., London, England, from March 24 to 27 received applications for £500,000 (\$2,500,000) of a new issue of £1,000,000 (\$5,000,000) 4½ per cent. second debentures, due in December, 1960. The offering price was 92½ per cent.

A dividend of 3⅞ per cent. has been declared for the last half year of 1908 on the first preferred stock, making 7⅞ paid for the year 1908. Eight per cent. was paid in 1907.

MICHIGAN CENTRAL.—J. P. Morgan & Co., the First National Bank and the National City Bank, all of New York, are offering \$10,000,000 4 per cent. debenture bonds of 1909-1929 at 95. This is part of a recently authorized issue of \$25,000,000.

NEW YORK, NEW HAVEN & HARTFORD.—See Boston & Maine.

PORTLAND RAILWAY LIGHT & POWER.—Bond & Goodwin, New York, are offering the unsold portion of \$1,000,000 three-year collateral trust 5 per cent. notes of 1909-1912 at 99¼, yielding 5¼ per cent.

PUBLIC SERVICE CORPORATION OF NEW JERSEY.—Holders of \$6,250,000 convertible notes of 1906-November 1, 1909, are given the privilege of converting, between April 15 and May 1, their notes into stock at par.

ST. LOUIS & SAN FRANCISCO.—The syndicate formed in December, 1908, by Speyer & Co., New York; Speyer Bros., Lon-

don; Lazard Speyer-Ellissen, Frankford-on-Main; the Deutsche Bank, Berlin, and Teixeira de Mattos Bros., Amsterdam, to take over \$30,000,000 general lien 5 per cent. bonds of the St. Louis & San Francisco has been liquidated. The syndicate has bought additional bonds of the same issue. The amount is said to be about \$5,000,000.

SEABOARD AIR LINE.—The following sub-committee representing the various interests has been formed to prepare a plan of reorganization for submission to the full committee: Thomas J. Hayward, of Baltimore, representing the Continental Trust Co. of Baltimore, which is trustee for the 4 per cent. bonds; James A. Blair, of New York, representing the stock of the Seaboard Company; John Skelton Williams, of Richmond, representing the old Seaboard Air Line stock; Ernst Thalman, of New York, representing the collateral trust bonds, and Russell G. Fessenden, of Boston, representing both bonds and stock. C. Sidney Shepard, of New York, chairman of the general reorganization committee, is ex-officio chairman of the sub-committee.

SIXTH AVENUE RAILROAD (NEW YORK).—The quarterly dividend, 1¼ per cent., due April, 1909, and guaranteed by the Metropolitan Street Railway, is not to be paid at present. President Curtiss says:

"Because of the unsettled state of affairs of the lessee company, and the fact that certain franchise taxes imposed on its companies' property have not been paid by the lessee company, which taxes are in litigation, your directors have decided not to declare the usual dividend at present."

SOUTHERN RAILWAY.—J. P. Morgan & Co., New York, have bought an additional \$5,000,000 development and general mortgage 4 per cent. bonds and offer to exchange these bonds, together with other bonds of the same issue previously bought, at 80 for 6 per cent. notes of the \$15,000,000 issue due May 1, 1911, at 100¼.

The Southern has drawn by lot \$3,891,000 6 per cent. convertible notes due May 1, 1911, but redeemable at the option of the company in 1909 for redemption at par.

WESTERN MARYLAND.—The \$1,250,000 receiver's certificates of April 1, 1909-1911, have been sold by the receiver.

FOREIGN RAILWAY NOTES.

A consular report gives the following information concerning recently issued imperial ordinances dealing with the management of railways in Japan: Heretofore railway administration has been in charge of the department of communications, but by the new plan a board has been formed which will take over the entire management of the railways, independent of the cabinet. The premier will have a general control, but the present minister of communications has been appointed the first president of this board, in addition to his other duties, and will no doubt perform all the functions generally incident to that office. The accounting will be done by the board, entirely separate from the other affairs of the government. It is believed that this step will correct the method which followed the sudden nationalization of the railways after the late war.

The report of the South Australian Government Railways for the half-year ended December 31, 1908, has been issued by the railway commissioners. Earnings are less by \$204,170 than in the same period of 1907, and working expenses are \$215,345 greater. The following table shows results for the last half of 1908, as compared with the corresponding period of 1907:

	Southern Province. —Half-year ended—		Northern Territory. —Half-year ended—	
	1907.	1908.	1907.	1908.
Approximate earnings	\$4,507,500	\$4,308,000	\$41,475	\$36,805
Approximate working expenses ..	2,225,000	2,441,750	32,465	31,060
Net balance	\$2,282,500	\$1,866,250	\$9,010	\$5,745
Working exp. p. ct. to earnings ..	49	57	78	84
Train-mileage run	2,529,757	2,616,813	15,873	15,590
Earnings per train-mile	\$1.79	\$1.64	\$2.60	\$2.35

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The *Boston & Maine* is said to be in the market for 28 passenger, 20 mogul and 10 switching locomotives. This item is not confirmed.

The *Temiskaming & Northern Ontario* locomotives reported in the *Railroad Age Gazette* of April 3 as being built by the Canadian Locomotive Co., will have the following additional special equipment:

Axles	Open-hearth steel
Bell ringers	Sansom
Boiler lagging	Carey, 85 per cent. magnesla
Brake-beams	Simplex
Brake-shoes	Steel back
Couplers	Tower
Driving boxes	Steel
Headlight	Adams & Westlake
Injectors	Ohio, No. 8
Journal bearings	Canadian Bronze Co.
Piston and valve-rod packings	U. S. metallic
Safety valve	Coale
Sanding devices	Wilson
Lubricators	Detroit
Staying	Monkbridge staybolt iron
Steam gages	James Morrison, Toronto
Steam heating equipment	Consolidated
Tubes	"Kerva"

The *Canadian Pacific*, as reported in the *Railroad Age Gazette* of April 9, has ordered two Pacific locomotives from the American Locomotive Co.

General Dimensions.

Weight on drivers	140,000 lbs.
" total	214,000 "
" tender	131,000 "
" engine and tender	345,000 "
Cylinders	21 in. x 28 in.
Diameter of drivers	69 in.
Boiler, type	Wagon top
" working steam pressure	200 lbs.
" outside diameter, front end	67 1/2 in.
Firebox, width	70 "
Firebox, length	94 "
Heating surface, tubes	2,765 sq. ft.
" firebox	194 "
" total	2,959 "
Tubes, number	193
" outside diameter	2 1/4 in.
" superheater, number	22
" superheater, outside diameter	5 in.
" length	19 ft. 6 in.
Grate area	45.7 sq. ft.
Tractive effort	30,400 lbs.
Water capacity	5,000 imp. gals.
Coal capacity	10 tons.

CAR BUILDING.

The *Boston & Maine* is said to be in the market for 900 thirty-ton steel underframe box cars. This item is not confirmed.

The *Northern Pacific* has ordered one 55-ft. all-steel combination passenger and baggage gasoline motor car from the McKen Motor Car Co.

The *Columbus Railway & Light Co.*, Columbus, Ohio, has ordered 30 pay-as-you-enter cars from the American Car Co., for delivery in September.

The *Wabash-Pittsburgh Terminal*, as reported in the *Railroad Age Gazette* of April 2, has ordered 500 fifty-ton self-cleaning, hopper bottom gondola cars from the Standard Steel Car Co. These cars will weigh approximately 37,500 lbs. and will be 30 ft. long, 9 ft. 5 1/2 in. wide and 6 ft. 10 in. high, inside measurements, and 31 ft. 6 in. long, 10 ft. wide and 10 ft. high over all. The bodies and underframes will be of steel. The special equipment will include:

Axles	Open-hearth steel; Carnegie Steel Co.
Bolsters, body	Standard Steel Car Co.
Bolsters, truck	Simplex; American Steel Foundries
Brakes	Westinghouse
Brake-beams	Waycott; Damascus Brake-Beam Co.
Brake-shoes	Streeter type, steel back;
	American Brake-Shoe & Foundry Co.
Brasses	Damascus Bronze Co.
Couplers	Simplex; American Steel Foundries
Door fastenings	Simonton
Draft gear	Miner tandem, Class G springs
Journal boxes	McCord
Paint	Suydam
Side bearings, roller	Stucki patent
Trucks	Andrews cast-steel; Am. Steel Foundries
Wheels	33-in. cast-iron; Standard Steel Car Co.

The *Long Island*, as reported in the *Railroad Age Gazette* of April 2, has ordered 114 fifty-ton box and 20 fifty-ton gon-

dola cars from the Pressed Steel Car Co. The box cars will be 36 ft. long, 8 ft. 6 in. wide and 8 ft. high, inside measurements, and 39 ft. long over running board, 10 ft. 1 1/4 in. wide over all, and 12 ft. 8 5/8 in. high, over running board. The bodies will be of wood and the underframes of steel. The gondola cars will be 37 ft. 5 in. long, 9 ft. 4 in. wide and 3 ft. 10 1/2 in. high, inside measurements, and 40 ft. 2 in. long over flooring, 10 ft. 2 in. wide and 8 ft. 8 in. high, over all. The bodies will be composite and the underframes of steel. The special equipment will include:

Axles	Open-hearth steel
Bolsters, body	Steel
Bolsters, truck	Steel
Brakes	Westinghouse
Brake-beams	Simplex
Brake-shoes	Cast-iron
Brasses	Ajax Metal Co.
Couplers	Sharon
Draft gear	Westinghouse
Journal boxes	Cast-iron
Paint	L. I. R.R. standard
Roofs	Winslow, with steel carlines
Springs	Union Spring & Mfg. Co.
Trucks	Arch bar
Wheels	Cast-iron

The box cars will have Wagner doors and the gondola cars will have swing side and drop end doors.

IRON AND STEEL.

The *Buffalo, Rochester & Pittsburgh* is in the market for 3,500 tons of bridge steel.

The *Idaho & Washington Northern* has ordered 2,000 tons of rails from the Illinois Steel Co.

The *Chicago, Indianapolis & Louisville* has ordered 2,500 tons of rails from the Illinois Steel Co.

The *Pennsylvania Lines West* are in the market for 1,100 tons of structural steel for track elevation in Chicago.

The *Pennsylvania Tunnel & Terminal Co.* is said to have ordered 10,000 tons of conductor rails from the Cambria Steel Co.

The *Carolina, Clinchfield & Ohio* is said to have ordered 5,000 tons of rails from the Tennessee Coal, Iron & Railroad Co. and 7,000 tons from the Carnegie Steel Co.

The *Great Northern* has ordered 11,000 tons of rails from the Illinois Steel Co. This is in addition to a previous order for 6,500 tons, reported in the *Railroad Age Gazette* of January 29.

The *Minneapolis, St. Paul & Sault Ste. Marie*, reported in the *Railroad Age Gazette* of April 2 as being in the market for 6,000 tons of rails, has placed that order with the Illinois Steel Co.

The *New York Central Lines* have ordered 3,500 tons of 100-lb. rails from the Illinois Steel Co. These rails will replace 80-lb. sections now in track on the Lake Shore & Michigan Southern, which latter will be used in construction work on the Lake Erie & Pittsburgh.

General Conditions in Steel.—There is a reported feeling in United States Steel Corporation circles that a gradual but steady improvement in business is evident. When price reductions were announced not long ago, business was brought almost to a standstill, since consumers held off in hope of getting still lower prices. As prices reached a low limit, there was a gradual resumption of buying and the reports of the last sixty days indicate a large volume of business. Reports credited to Pittsburgh and Cleveland say that a cut in rail prices is again being discussed, and that a western road has prepared specifications for its 1909 rail requirements, but will not place any contracts at present, due to a belief that rail prices will be cut.

RAILROAD STRUCTURES.

ANTIGO, WIS.—The *Chicago & North Western* is said to have plans made for building machine and repair shops at Antigo.

CHICAGO.—The *Grand Trunk* has given a contract for the erection of a one-story passenger station at South Halstead and Forty-ninth streets to the Charles A. Moses Construction

Co., Chicago. It will be of brick, 50 ft. x 125 ft., and will cost \$25,000.

ELKHART, IND.—The Cleveland, Cincinnati, Chicago & St. Louis is said to have plans ready for building an eight-stall roundhouse to replace the structure recently destroyed by fire.

FT. WORTH, TEX.—The Texas & Pacific will rebuild the roundhouse, machine shops, coal chutes, etc., that were burned on April 3. The new roundhouse, contract for which has been given to the O'Rourke Construction Co., Ft. Worth, Tex., will have 36 stalls and will be entirely of fireproof material. The machine shop will have dimensions of 75 ft. x 175 ft. and boiler house will be 30 ft. x 60 ft. New water tanks and coal chutes are also included in the plans. The new structures will cost approximately \$105,000. (April 9, p. 823.)

MILWAUKEE, WIS.—See Chicago & North Western under Railroad Construction.

NORFOLK, VA.—Of the bids for building the proposed offices and freight sheds recently opened by the architect of the Norfolk & Southern, the one of West Richardson, contractor, Hampton, Va., amounting to \$124,224 was the lowest figure covering both buildings. The bid of the Central Carolina Construction Co., Greensboro, N. C., for the office building was \$64,083, and the bid of West Richardson for the freight sheds was \$52,504. These separate bids will probably be accepted since their total is considerably less than the lowest single bid, that of West Richardson.

ROSCOE, TEX.—According to press reports, new shops and roundhouse for the Roscoe, Snyder & Pacific will be built.

ST. JOHNS, QUEBEC.—Press reports indicate that the Canadian Pacific will replace its present single-track bridge over the Richelieu river with a double-track steel structure. Plans and estimates have been prepared.

SAN ANGELO, TEXAS.—See Kansas City, Mexico & Orient under Railroad Construction.

WENATCHEE, WASH.—The Great Northern has prepared plans for a roundhouse, turntable, ash pits and coal chutes to be erected on property recently acquired at this place. Additional trackage facilities will also be added and it is probable that a freight shed will be built especially adapted to expedite the handling of fruit. (Jan. 1, p. 38.)

SIGNALING.

The New York Central is to erect automatic block signals on the West Shore division from Newburgh northward to Kingston, 31½ miles. These signals will be electric motor, with semaphores moving in the upper quadrant, and normal danger. The line is double track and trains are now run under the telegraph block system. The contract has been awarded to the Hall Signal Company.

The Philadelphia & Reading has asked for bids until noon of May 26 for block signals for the reconstructed line, which is to be built in connection with the grade revision between Green street and Broad street, Philadelphia, 2.2 miles; and also for the signal bridges necessary on the new line between Norris street and Broad street; also for two signal cabins. W. Hunter, Chief Engineer, Philadelphia.

The Tata Iron & Steel Company, of India, is building works near Kalimati station, and about 20 square miles have been taken on a long lease for the purpose. The manager of the different parts of the work will arrive from the United States early in January. A railway of 45 miles is already under construction. Orders for traveling cranes, rails, fishplates, stone crushers, weigh bridges, etc., have already been placed. Of these a large portion have already been shipped and 4,000 workmen are already employed on the site of the new plant for different work. It is said that the works will be ready to manufacture finished products by the end of December, 1910. The engineer in charge of this enterprise, as well as his first assistant, are Americans, and besides having thorough training as engineers have had practical experience in mill-work near Pittsburgh and the selection of equipment for the works is in their hands.

Supply Trade News.

The Eastern Granite Roofing Co., New York, has moved to new offices at 17 Battery place.

The Bucyrus Co., South Milwaukee, Wis., recently sold a locomotive pile driver to the Canadian Pacific.

The Isthmian Canal Commission, Washington, D. C., is asking bids up to May 17 on hand and push cars; warehouse trucks; blacksmith', machinists', carpenters' and track tools; drilis; rope; pulleys, etc. (Circular No. 506.)

The Homestead Valve Manufacturing Co., Pittsburgh, Pa., reports several sales of Homestead valves for use on pressure of 5,000 lbs. The Homestead valves are not blow-off valves only but are successfully used on the highest known pressures.

W. A. Campbell, formerly with the Hicks Locomotive & Car Works, Chicago, has been appointed the Sales Manager of the General Railway Equipment Co., Chicago, the organization of which was announced in the *Railroad Age Gazette* of April 9.

Tate, Jones & Co., Inc., Pittsburgh, Pa., have received an order through the Erie City Iron Works from the Union Pacific Railway at Omaha, Neb., for complete oil-burning equipment for use in connection with Erie City "Economic" boilers.

A. V. Kaiser & Co., Philadelphia, Pa., are in the market for a second-hand air compressor giving approximately 3,500 cu. ft. of free air per minute at 40 to 50 lbs. air pressure, running at a speed of from 75 to 100 r.p.m. and at 125 lbs. steam pressure.

The Carnegie Steel Co., Pittsburgh, Pa., has added to the 1,550 h.p. of Crocker-Wheeler form W motors already in use in its Duquesne plant by the purchase of three more motors of the same type, especially designed for rolling-mill work, aggregating 225 h.p., made by the Crocker-Wheeler Co., Amperre, N. J.

The Horace L. Winslow Co., Old Colony building, Chicago, has been incorporated with \$25,000 capital to do a general contracting and engineering business. The incorporators are: Horace L. Winslow, formerly with Julian L. Yale & Co., Chicago; C. R. Powell, vice-president of the American Car & Equipment Co., Chicago, and F. De Anguera.

R. D. Carver, Assistant General Sales Agent and General Manager of the Chicago office of the Pittsburgh Steel Co., Pittsburgh, Pa., died of pneumonia on April 11 at his home in Chicago. He was born at Cincinnati, Ohio, in 1865. Prior to his connection with the Pittsburgh Steel Co. he was Secretary of the Southern Steel Co., Birmingham, Ala.

The Sight Feed Oil Pump Co., Milwaukee, Wis., is receiving bids for the erection of a new factory on Reservoir avenue. The structure will be of brick with steel trusses, concrete foundation, saw-tooth roof and one story high. Upon its completion the machinery now in use, together with some additional new equipment, will be installed in the new building.

F. P. Jamison & Co., Seattle, Wash., have leased a four-story fireproof building at 2140 Pacific avenue, Tacoma, Wash., and Cadwalader Jones, formerly of Spokane, Wash., and a member of the firm, is placed in charge. The company is one of the largest dealers on the Pacific coast in contractors' tools, mine and logging equipment, cars, locomotives, etc. A complete stock will be carried at the Tacoma office. Branch offices are maintained also at Spokane and Vancouver.

The Hurley Track Laying Machine Co., Chicago, recently closed a second contract with the Erie Railroad whereby it leases a machine for track laying. This machine will be used on the Genessee River connecting line in New York. The work is expected to start from Cuba, N. Y., the latter part of April. The Erie had a Hurley track laying machine in use last summer on the Guymard cut-off, and the results were so satisfactory that it is now using it wherever practicable.

Frank N. Johnson, formerly president of the Scullin-Gallagher Iron & Steel Co., St. Louis, Mo., and well known in the railway supply trade, committed suicide on April 10. He was

connected for a number of years with the Simmons Hardware Co., St. Louis, Mo., and in 1903 was elected president of the Scullin-Gallagher company. He resigned from that company in 1907 and practically retired from active business. He was 60 years old, and a member of the St. Louis, Country and Noontday clubs of St. Louis, and of the St. Louis Railway Club.

Last week we printed a notice to the effect that E. D. Clapp had associated himself with the W. K. Kenly Co., Chicago. In becoming Vice-President and a Director of the W. K. Kenly Co., Mr. Clapp ceases to be the direct Chicago representative of the Jeffrey Manufacturing Co., Columbus, Ohio, and the Ohio Malleable Iron Co., of the same city; but he will continue to represent both concerns, as the W. K. Kenly Co. has been given the Chicago agency for the latter concern as well as for the products of the forge and foundry department of the Jeffrey Manufacturing Co.

W. H. Dayton, who for several years has been connected with the Railroad Supply Co., Chicago, and recently with the New York office of that company, has gone to St. Louis and will be associated with E. W. Hodgkins in the railway supply business under the firm name of Hodgkins & Dayton. This firm will represent the following companies as sales agents for St. Louis and southwestern territory, with offices in the Security building: The Railroad Supply Co., Chicago; the Dressel Railway Lamp Works, New York; Paul Dickinson, Inc., Chicago; Chicago Bridge & Iron Works, Chicago, and the Wyandot Refineries Co., Crawford, Ohio.

The Automatic Car Coupler Co., Los Angeles, Cal., the incorporation of which was announced in the *Railroad Age Gazette* of April 9, was organized under the laws of California to take over the patents of the Norwood-Bonney coupler and to manufacture and place the coupler on the market. The Norwood-Bonney coupler is in service on most of the cars of the Redondo Electric Railroad and is giving satisfaction. An order has also been received for equipping about 100 cars on another railway with this coupler. The officers of the company are: President, Frank R. Bonney; Vice-President, Frank H. Norwood; Secretary, Karl Elliott; Treasurer, C. H. Wills; Attorney, W. H. Soale. Mr. Bonney and Mr. Soale are now in Chicago negotiating for the manufacture of the coupler.

The business of the Western Electric Co., Chicago, for March made a better showing than any of the preceding months of the fiscal year, which began December 1, 1908. March sales were at the rate of about \$48,000,000 a year, and the rate for the four months ended with March was about \$45,000,000 a year. The company is still increasing the number of its employees, having added to its force about 2,000 men since the beginning of the fiscal year. It now is employing in all about 17,000 persons. The additions to the Hawthorne plant are being pushed ahead and will be completed this summer. While foreign returns have been received for only December and January, they show a slight increase in comparison with December and January, 1907-1908. The company's business abroad did not suffer during the last two years as did the domestic business, and hence the ratio of improvement is considerably less.

A. M. Gilbert, formerly President of the Buda Foundry & Manufacturing Co., Chicago, and the Paige Iron Works, Chicago, died at his home at Santa Barbara, Cal., on April 14. He was born in New Jersey in 1847. He moved to Chicago just before the fire of 1871 as Representative of the Howe Scale Co., Rutland, Vt., and later became Manager of Fairbanks, Morse & Co., Chicago. In 1890 he was elected Vice-President and General Manager of the Crane Co., Chicago, and in 1895 returned to Fairbanks, Morse & Co. as Vice-President. In 1903 he was elected President of the Buda Foundry & Manufacturing Co. and the Paige Iron Works, which position he held until 1908, when his health weakened. From that time he made his home at Santa Barbara. Mr. Gilbert was an energetic, able business man and possessed great ability as a financier. He was a member of most of the country and city clubs of Chicago and had been a member of the Chicago Club since 1873.

Louis G. Henes, Monadnock block, San Francisco, Cal., has recently started a railway, industrial and contracting equip-

ment business, and will cover the territory along the Pacific coast as far east as Salt Lake City, Utah, and the west coast of Mexico. Mr. Henes was formerly associated with the Niles-Bement-Pond Co. in its main office at New York. Immediately after the earthquake and fire in San Francisco he went there to manage the machine tool business of Harron, Rickard & McCone, who are the Pacific Coast agents of the Niles-Bement-Pond Co. On January 1 of this year he was appointed Pacific Coast Manager of the Commercial Acetylene Co., New York, manufacturer of a safety system of acetylene for use in locomotive headlights and car lighting. He has also been appointed Manager in that territory of M. Kirchberger & Co., New York manufacturers and distributors of the Von Schwarz and Crescent acetylene burners; also Manager of the Whiting Foundry Equipment Co., Harvey, Ill., manufacturer of cranes and foundry equipment, and Manager of Toch Brothers, of New York, manufacturers of technical railway and marine paints. Mr. Henes is also representative in the Pacific coast territory of the Railway Materials Co., Chicago, for its Ferguson oil furnaces; also of the Rostand Manufacturing Co., Milford, Conn., for the McCarthy baggage rack; also of Hubbard & Co., Pittsburgh, Pa., makers of picks, shovels and track tools; also of the Ward-Packer Supply Co., Chicago, manufacturer of Minnesota boiler compounds, metallic packing, Corning draft gear, Crosby bell ringer and Ames water glass shield; also of W. H. Foster & Co., New York, makers of the Lassiter special bolt machinery, and of the Frost Railway Supply Co., Detroit, Mich., manufacturer of Detroit metal weather strip.

TRADE PUBLICATIONS.

Dry Batteries.—The Western Electric Co., New York, is mailing a folder which tells of the merits of Blue Bell dry batteries for telephone service. This company will ship, free of charge, 10 of these cells for trial.

Great Northern.—A folder describing and illustrating the scenic northwest is being distributed. Different parts of Minnesota, North Dakota, Montana, Idaho, Washington, British Columbia, Oregon and Alaska are the subjects described in the folder.

Western Pacific.—"The Story of the Western Pacific" is told in a 24-page catalogue recently issued by the Denver & Rio Grande. The requirements of modern railway construction and the sources from which profits are secured are elaborately described. A number of illustrations show some of the scenery along the route.

Jacks.—The Duff Manufacturing Co., Pittsburgh, Pa., has just issued a catalogue which illustrates and describes Duff-Bethlehem forged steel hydraulic jacks in all styles and capacities for vertical or horizontal lift. These jacks are an entirely new line and of construction different from other jacks made by this company.

Paint.—The Detroit Graphite Co., Detroit, Mich., has just issued a booklet descriptive of the repainting of the Poughkeepsie bridge. This is one of the longest bridges in the world, and the magnitude of the work of designing the bridge, and especially of painting it, is concisely set forth. A copy of the booklet will be sent to anyone interested.

Chicago, Milwaukee & St. Paul.—The country on the North Pacific coast is attractively described in a 64-page catalogue that is now being distributed by the company. The grandeur of the country in the states of Oregon, Washington, Idaho, Montana, British Columbia and the territory of Alaska is described, and the illustrations show some of the agricultural and industrial possibilities and natural wonders of that territory.

Drills and Sockets.—The American Specialty Co., Chicago, has just issued a new catalogue on drills and sockets. The illustrations show both flat and twist drills for machine and ratchet work. The "Use-Em-Up" drill socket, made of one piece with a flat side forged within the socket, for using drills with broken tangs, is also made by this company. This socket was illustrated and described in the *Railroad Age Gazette* of September 18, 1908.

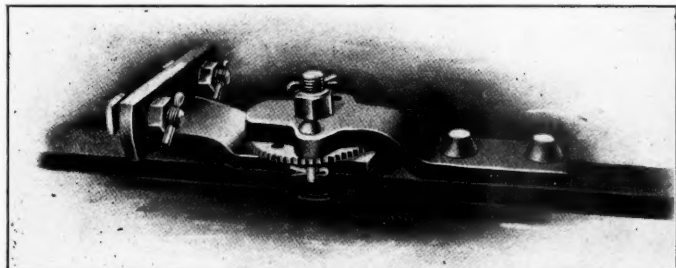
Northern Pacific.—"Eastward Through the Storied Northwest," by Olin D. Wheeler, is the title of a 62-page catalogue

that has been issued by this road. A good description is given of the climate and scenery of California, Washington, British Columbia, Montana and the Yellowstone Park, as well as of the educational and industrial opportunities in the northwest. Several tables give the altitudes of principal points, fares, accommodations and a partial list of the publications covering specific parts of the country.

Track Supplies and Railway Material.—Catalogue No. 127, just issued by the Buda Foundry & Manufacturing Co., Chicago, is one of the publications sent into the railway field that is worthy of a very careful perusal and should afterwards be indexed as a reference encyclopedia of track supplies and various railway materials. The publication contains 424 pages of descriptive matter and illustrations, each device being thoroughly explained. New features of Buda products will be found in the pages describing water softening plants, railway motor cars and velocipedes, hand and push cars, replacers, jacks, switch stands, drills, crossing gates, frogs, crossings and switches. Attention is also directed to the complete offerings in extra durable scales. Indicative of the thoroughness with which this catalogue is prepared is the fact that the part devoted to motor cars and other types of cars fills 70 pages, in which are 60 half-tone illustrations and describes 40 different types of cars, each designed to meet different requirements. The repair parts of the cars are also shown in detail and listed, giving sizes and prices. In addition to the materials already mentioned the catalogue describes wrecking frogs, track gages and levels, rail benders, bumping posts, battery chutes, cinder pit ties, Buda stoves for stations, roundhouses and cabooses, etc. An index in the back makes the contents of the book easily accessible.

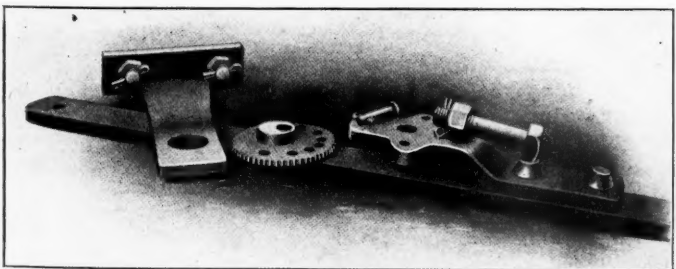
Buda Adjustable Switch Rod.

The "Buda" adjustable switch rod is shown in the accompanying illustrations. Simplicity of construction, substantialness and durability are the principal claims, together with the fact that it is unnecessary to remove the center, or main retaining bolt, to effect adjustment. Only the auxiliary pin at the side is withdrawn and the



Buda Adjustable Switch Rod.

eccentric moved in either direction as desired, after which the auxiliary pin is returned. Adjustments can be made as close as $\frac{1}{16}$ in. With the auxiliary pin in the position shown, the adjustment is within $\frac{1}{8}$ in., but by putting the auxiliary pin on the opposite side and throwing over the eccentric wheel to correspond, the extremely close



Parts of Buda Switch Rod.

adjustment of $\frac{1}{16}$ in. is obtained. Removal of the main retaining bolt of an adjustable switch rod often necessitates cutting off the nut on account of rust. If the trackmen does not have another nut that will fit, the switch has to be spiked temporarily. But, of course, it is well to avoid removal of the main bolt at any time, if possible.

In the type here shown, the head, or No. 1 rod, is usually fitted

with an adjustment at both connections with the switch point in order that with switch stands set approximately true each point may be adjusted to its stock rail without shifting the stand. The No. 2 rod has one adjustment, and the No. 3 rod is usually rigid. The Buda Foundry & Manufacturing Co., Chicago, is the maker.

Winans Rail Joint.

The rail joint illustrated herewith was invented by L. Winans, of Portland, Ore. It is made preferably of malleable iron or cast-steel, or can be rolled if desired. The lengths are 24 in. for a four-hole joint and 28 in. for a six-hole joint. The weights for four-hole joints in malleable iron range from 30 lbs. for a 60-lb. rail to 40 lbs. for an 85-lb. rail, and 50 lbs. for a 90-lb. rail. As the illustration shows, the base plate has a deep central rib for stiffening and has a downward flange at each end to prevent rail creeping. A plain angle bar is used on the inside of the rail.

Laboratory tests on a malleable joint for a 90-lb. rail having a base plate $\frac{3}{8}$ in. thick and a rib $\frac{3}{4}$ in. thick showed a safe working



Winans Rail Joint.

load of 50 tons without deflection. At 75 tons there was a deflection of 0.04 in. without permanent set, and at 100 tons there was a permanent set of 0.06 in. The test was made by the Pittsburgh Testing Laboratory.

Joints of this design have been in experimental service on two steam roads and one interurban electric road for three years with gratifying results. They are now on trial on four prominent steam and one elevated railway, and orders have been given by several other steam roads for trial lots. The Winans Rail Joint Co., Portland, Ore., has been formed to put the joint on the market.

The Lifting Magnet in Railway Work.

Lifting magnets have been manufactured by the Electric Controller & Manufacturing Co., Cleveland, Ohio, for the past 10 years. Early in 1905 it put on the market a magnet suitable for handling all kinds of miscellaneous iron or steel. This type was first introduced into steel mills for handling scrap. The service in the steel mills is very severe, the magnets being worked 24 hours per day, and in some cases making as many as four lifts per minute. The magnet has been perfected till it meets this very severe service entirely satisfactorily and is considered more dependable than the crane from which it operates.

Since railways have great quantities of iron and steel to handle, the use of magnets would save them a great deal of money and make them independent of a very troublesome class of labor. The magnet handles not only all kinds of scrap and small castings, but almost any other iron and steel used by or handled by a railway, and railways are beginning to use magnets, especially in the stores departments. A magnet is most efficiently operated from an overhead electric traveling crane, but the stores or shop yards are usually so extensive as to call for a steam driven locomotive crane. In these cases the Electric Controller & Manufacturing Co. is prepared to furnish small steam-driven generator sets for supplying the magnet with current.

The photographs show the work that may be accomplished with one of these Type S-A Magnets. Fig 3 shows the magnet lifting rails of about 50-lb. section. This magnet will lift about all the rails it will cover, no matter what the weight of the section is, if they are piled evenly, and will lift five or six rails even if piled indiscriminately, as a section gang would load them in a car. Such a lift is shown in Fig. 2.

Fig. 6 shows a lift of nine car axes which weigh about 200 lbs. each and which were lifted from a single row on the flat car.

Fig. 1 shows the magnet lifting a cylinder casting which weighs about 2,000 lbs.

Fig. 4 shows a lift of track bolts in the keg, there being six to eight kegs per lift.

Fig. 5 shows a lift of four car wheels on their axles, the magnet being between the wheels and lifting from the axles.

Fig. 7 shows a typical lift from the scrap dock, which lift probably weighs in the neighborhood of 1,200 lbs. A good crane operator can with this magnet put scrap on the dock from cars at the rate of a ton a minute. The magnet can be attached to or detached from the crane in less than a minute, so that it does not interfere with the use of the crane for handling timbers and other non-magnetic material.

A magnet of this same size is used by the Chicago & North Western

Co. on the scrap dock at its Chicago shops. It is handling from: 1,000 to 1,300 lbs. per lift of nuts and spikes; 1,100 to 1,200 lbs. per lift of driver brake shoes; 800 to 1,000 lbs. per lift of cast car brake shoes; 800 to 1,000 lbs. of flue ends, averaging about 8 in. long.

It is handling all of the material received at this dock which is within the capacity of the crane in a satisfactory manner.

The Chicago, Rock Island & Pacific has one of these magnets in its store yard at Silvis, Ill., and reports the following results: 1 1/2-in.

per lift, weight 3,000 lbs.; 1/2-in. x 4-in. x 4-in. angles, 37 ft. long, 10 pieces per lift, weight per lift 4,580 lbs.

The above data is on the No. 3 Type S-A magnet, which is 36 in. in diameter and the No. 4 Type S-A magnet, which is 43 in. in diameter.

In practice it has been found that each magnet takes the place of from seven to 14 laborers, effecting a saving on this score alone of from \$10 to \$30 dollars per day. It has reduced the cost per ton handled from 10 or 25 cents to 2 cents per ton, or less. These sav-



Fig. 1.



Fig. 2.

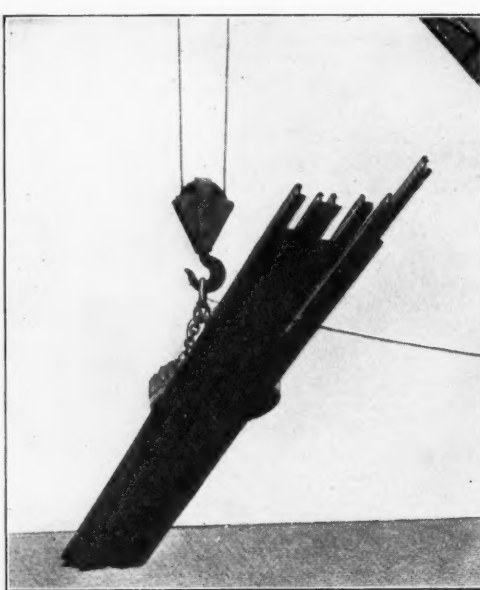


Fig. 3.



Fig. 4.



Fig. 5.

round bar iron, 16 to 18 ft. long, 2,100 to 2,400 lbs. per lift; five 65-in. locomotive driving wheel tires, lifted from the tread, weight not ascertained; three locomotive smokestacks per lift, weight of each stack 650 lbs.; cylinder casting with half the saddle, weight 4,000 lbs., magnet lifting from the side of the cylinder so that only a line contact was obtained; seven 1/4-in. plates, 60 in. wide by 72 in. long.

At other points these same magnets are handling such material as: Cast-iron pipe, 3 ft. in diameter, each weighing 2,000 lbs., one per lift; cast iron sections for the retaining wall of the East river tunnel under the Hudson river, these castings being concave on one side and convex on the other and of a radius to conform with the diameter of the tunnel, weight each 4,000 lbs., one per lift; paper filled car wheels, weight not known, two wheels per lift, handled either from the tread or from the hub; steel pipe 5 in. in diameter, 30 ft. long, seven

ings will quickly pay not only for the magnet but for a locomotive crane from which to operate it.

The Electric Controller & Manufacturing Co. builds larger magnets, known as the No. 5 Type S-A, which is 52 in. in diameter, and the No. 6 Type S-A, which is 60 inches in diameter, of very much greater capacity than those mentioned above, but these magnets are not applicable to operation from locomotive cranes on account of their weight and the larger sizes of generating sets necessary to supply them with current. However, where an electric overhead crane is available one of these larger sizes might be more suitable to the work.



Fig. 6.



Fig. 7.